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Testing Methods for Latex, Latex Compounds, and Artificial Dispersions of Rubber

By D. E. Fowler and Williamina Thompson
Development Dept., Naugatuck Chemical Division, U. S. Rubber Co.

PART I

CONTROL testing has long been recognized as a valuable aid to manufacturers in many fields. It is a particularly useful instrument to men working with a substance which is as complex and widely variable as latex. Rubber latex contains a large quantity of non-rubber constituents which control the colloidal properties of the material. The source, the method of concentrating and preserving the latex, and the bacteria and enzymes present all exert an influence on the state of these non-rubber constituents.

With so many variable factors affecting the physical and chemical properties it is obviously desirable to examine the raw material for uniformity before it is used in manufacturing processes. Furthermore, since the material undergoes many changes, physical and chemical, in the course of compounding, it is necessary to test latex compounds to determine their suitability for use in processing.

It is the purpose of this article to present the analytical methods which the authors believe are best suited for the examination and control of rubber latex, latex compounds, and artificial dispersions of crude and reclaimed rubber.

Sampling

The reliability of test results is directly dependent on the reliability of the method used for sampling the material. It is necessary to observe special precautions to obtain a sample of latex which is representative of the entire lot. Any type of latex tends to cream and become non-homogeneous to a greater or less extent. Many compounding ingredients settle out of latex on standing.

If the material has stood for a time it must be thoroughly mixed before withdrawing a sample. Latex in drums should be stirred with a high speed stirrer of the propellor type for a period of ten to fifteen minutes. In the case of tank-car lots, the latex should be agitated with an air line which should be moved from one end of the car to the other continually for at least one-half hour. The sample is then taken by drawing a narrow mouth bottle rapidly through the latex until full.

EDITOR'S NOTE: Part II of this article will appear in a subsequent issue.

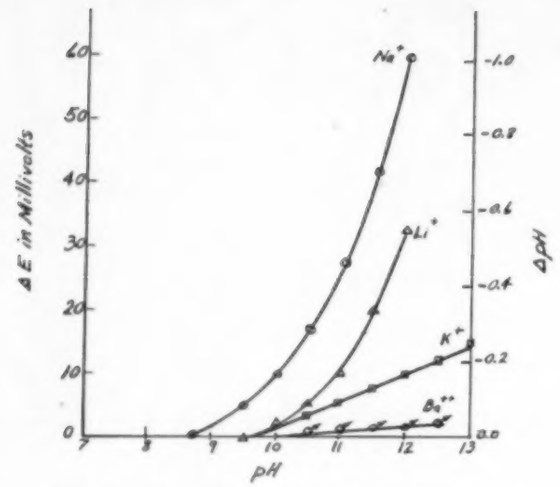

FIG. 1—Errors of Glass Electrodes in 1N Solutions.

Total Solids

One of the first considerations in testing latex is the establishment of a criterion for purchase. Either the total solids content or the dry rubber content is usually accepted as the basis of evaluation. A greater degree of accuracy can be achieved in the determination of total solids than is possible in the determination of dry rubber content so the former is a more satisfactory standard.

The total solids are determined by drying down a weighed sample of latex, weighing the resultant film, and expressing the result as percentage total solids based on the whole original latex.

About 2.5 ± 0.5 grams of the sample are weighed in a low covered weighing dish about 6.25 cm. (2.5 inches) in diameter on an analytical balance. Tinned 2-ounce ointment cans are particularly well adapted to this use since they provide a rapid heat transfer and are so inexpensive that they may be thrown away if at all difficult to clean.

The samples should be dried to constant weight in an air or vacuum oven at 70° C. when highly accurate and reproducible results are required. For most practical purposes, however, a more rapid method of drying is desirable even though it may give slightly low results. Uncompounded latex samples may be dried in a vacuum oven at 120° C. without any apparent deterioration of the rubber, provided a 2 gm. sample is not left in the oven more than thirty minutes.

Compounded latices under these conditions may give slightly lower results than are obtained by the standard method at 70° C., depending on the nature of the compounding ingredients.

The method generally accepted for the determination of the dry rubber content *(1)* is inconvenient and the results obtained are only difficultly reproducible. The method consists of coagulating a diluted sample of the latex with acetic or formic acid, drying and weighing the coagulum. The dry rubber content can be approximated from the solids for unwatered normal latex by calculation.

Dry rubber content + 2.3 = total solids.

Ammonia and Other Alkalies

A preservative must be added to latex to limit the bacterial action which causes a breakdown of the material. Ammonia is commonly used for this purpose. In many processes, however, an excess of ammonia is undesirable because it makes coagulation more difficult; it may produce unstable compounds when ZnO is added, it makes working conditions unpleasant, and it may retard the cure, so it is necessary to have an accurate knowledge of the amount of ammonia present.

In raw latex ammonia can usually be determined by direct titration with standard acid to a methyl red end point.

Weigh about 10 grams to the nearest centigram in a 400 ml. rubber-extraction flask. Add about 200 ml. of water, a few drops of methyl red indicator, and titrate with 0.1 N acid. The acid should be added at a moderate rate and the sample should be agitated during the titration to prevent local coagulation.

$$\frac{\text{ml. acid} \times \text{normality factor} \times 1.7}{\text{weight of sample}} = \%\ \text{alkalinity as ammonia}$$

The direct titration method is frequently not applicable to compounded latices either because of the presence of other basic materials such as caustic alkalies, borax, basic silicates or soaps, or pigments which hide the end point. When this is true the ammonia can be determined by the distillation method.

Weigh about 10 grams of the sample from a weighing pipette into an 800 ml. Kjeldahl flask containing about 250 cc. of distilled water. Add 4 grams of magnesium oxide to the solution. Distill over about 100 ml. into an excess of .1N sulfuric acid. Boil the distillate for 2 minutes and after cooling back-titrate the excess of standard acid with .1N sodium hydroxide using methyl red as an indicator.

$$\frac{(\text{ml. acid} \times \text{N factor}) - (\text{ml. base} \times \text{N factor}) \times 1.7}{\text{weight of sample}} = \%\ \text{Ammonia}$$

The amount of fixed alkali present may be estimated from the difference between the total alkalinity by direct titration and the ammonia as determined by distillation.

Water Solubles

The determination of the water solubles content of latex is an aid in detecting differences in the non-rubber constituents of different latices and in predicting the water absorption or electrical properties of the latex film. Ordinary extraction methods are not satisfactory for leaching water solubles from latex because the extraction is likely to be incomplete and the results depend on the amount of surface of the sample extracted.

A method for determining water solubles *(2)* which has proven satisfactory consists of coagulating the ammonia free latex by adjusting to the isoelectric point of the protective protein with a known amount of acid, then weighing the water soluble material remaining as the evaporation residue from an aliquot of the serum. The method in detail is as follows:

By means of a weighing pipette, weigh 5 grams of the sample into a 400 ml. beaker, add about 200 ml. of water, cover with a watch glass, and boil on a hot plate until the volume has been reduced by one-half. Transfer to a 200 ml. volumetric phosphoric acid flask and make up to within about 10 ml. of the mark. Add 1 ml. of a 0.1 per cent methyl orange indicator solution and add 1 normal sulfuric acid from a burette until the red-orange color, indicating a pH of about 4.3, is obtained and the rubber is well coagulated. Care must be taken not to add too much acid as the sample will not coagulate so well at a lower pH. Shake well to complete coagulation and make up to the mark.

Filter the solution and pipette 100 ml. of the clear serum into a weighed evaporating dish. Evaporate to dryness on a steam bath, dry in an air oven at 70° C., cool and weigh.

$$E = \left\{ \frac{W\left(200 - \frac{STR}{10{,}000D}\right)}{100} - (0.049\,AN + I) \right\} \frac{10{,}000}{ST}$$

E = per cent of water extract based on the solids.
W = weight of dry material in 100 ml. aliquot.
T = per cent of total solids.
R = percentage of rubber expected in the solids of the sample. For normal latex 92 per cent, for creamed latex 97 per cent.
D = density of rubber (about 0.92).
A = volume of sulfuric acid used.
N = normality of sulfuric acid used.
I = weight of indicator used, in grams.
S = weight of sample.

The water solubles present in normal latex are about 8.5 per cent and in centrifuged or creamed latex about 2.6 per cent of the total solids.

This method has been highly successful with uncompounded latices but is not directly applicable to some latex and dispersions compounds. Zinc oxide and other compounding materials will react with the acid during the titration and proper corrections must be applied. It is, therefore, important that the analyst be familiar with the compounding ingredients present.

pH and KOH Number

The colloidal properties of latex are very closely related to the pH of the material. For this reason a convenient and accurate method of determining pH of the solution is desirable. Although there are several methods in use on less complex systems only the glass electrode has proven satisfactory with latex compounds.

The presence of proteins which affect the reaction of indicators and the difficulty in matching colors make the use of indicators unsatisfactory. The relative ease with which the hydrogen electrode is poisoned by certain sulfur-containing proteins and traces of hydrogen sulfide make it unsuited for use with latex. Another difficulty which is encountered with the hydrogen electrode is the tendency of rubber to coat the platinum inner electrode. The quinhydrone electrode gives reliable results only in the region below pH 8.0 and is, therefore, of no value in the field of latex where the pH most frequently encountered is well above this.

Before the glass electrode was manufactured commercially considerable careful work was done on the calibration and use of the antimony electrode in latex *(3)*. Reproducible results were obtained with this electrode particularly on raw material latex. However, some of the more important compounding ingredients used in latex, such as sulfur and sulfur containing accelerators, affect the validity of the antimony electrode as a means of measuring pH.

The most convenient and most accurate device for measuring the pH of latex is the glass electrode. Very constant and reproducible results have been obtained with this instrument. With the exception of sodium ions, the constituents of latex and latex compounds do not seem to have any poisoning effect on the glass electrode.

A thin glass shell which contains a standard reference electrode, usually of quinhydrone in a solution of unit pH, is an essential part of the glass electrode. The complete cell *(3)* is briefly:

Standard half-cell (calomel or quinhydrone)	0.120 N HCl (pH = 1.0)	glass	solution pH = X	standard half-cell

The pH is measured by the potential arising at the glass-solution interface. Complete descriptions of the construction of the electrode and the potentiometric setups are given in manufacturers' pamphlets and in the literature *(4)*.

Although the glass electrode shells are made with great reproducibility, the assymetry of the shells changes with use so it is necessary to calibrate the electrodes daily in buffer solutions. A 0.05 molar solution of potassium acid phthalate is a good buffer solution with a pH of 3.97 *(5)*. A buffer solution with a pH of 9.82 may be prepared from anhydrous potassium carbonate and anhydrous potassium bicarbonate. The proportions used are:

Anhydrous K_2CO_3	7.0 gms.
Anhydrous $KHCO_3$	5.0 gms.
Distilled water to make	500 cc.

For highly accurate work the pH of the buffer should be checked against the hydrogen electrode.

The high resistance of the glass electrode makes it necessary to use a very sensitive galvanometer and to protect the instrument from possible sources of current leakage particularly in humid weather. The d'Arsonval galvanometer and the vacuum tube galvanometer are both sufficiently sensitive for use in conjunction with a potentiometer. Special precautions must be taken to shield the electrodes from leakage of current. Provision should also be made for the regulation of the temperature of test solutions.

The most marked limitation of the glass electrode is in measuring the potential of alkaline solutions containing sodium ions. The presence of sodium ions in solution with a pH above 9 to 10 depresses the potential of the glass electrode considerably. While other metallic ions show a similar tendency, it is not nearly so pronounced as in the case of sodium ions (Fig. 1). It is difficult to accurately estimate the sodium error and where it is important to know the pH of commercial compounds it is common practice to prepare an identical sample compound substituting potassium for sodium salts for this determination.

The KOH number is a factor of great importance to compounders of latex because it defines quantitatively the amount of KOH necessary to just neutralize the buffering constituents of the latex. The best conditions

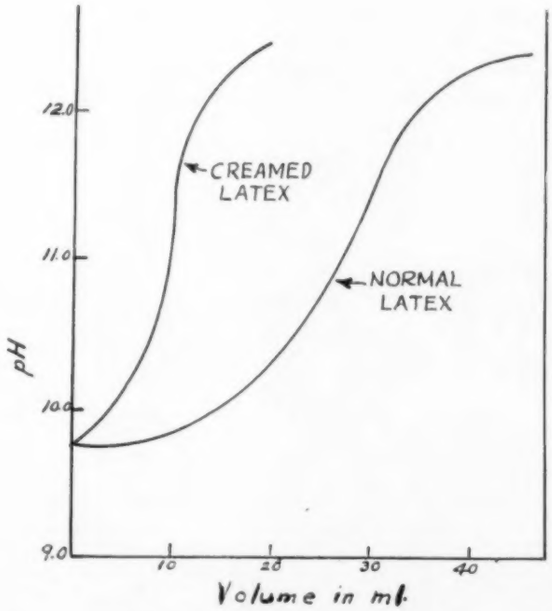

FIG. 2—Titration of Latex with N/2 KOH.

of stability and viscosity of certain compounds such as those containing ZnO are dependent upon the adjustment of the pH of the material to this critical point *(6)*.

The KOH number *(6)* is defined as the number of grams of KOH per 100 gms. of rubber corresponding to the end point (at pH 10.7 to 11) in the electrometric titration of latex.

A 250 ml. beaker is set up to accommodate the glass and calomel electrodes and a small adjustable speed electric stirrer.

100 grams of latex are weighed into the beaker and diluted with water until the electrodes and stirrer are well immersed. The mixture is stirred to provide good mixing but not enough to cause the latex to surge around the electrodes.

Half-normal potassium hydroxide is added from a burette in ml. quantities. The alkali is allowed to mix in for 20 seconds (the actual time is not important but must be kept the same for each addition) before the E.M.F. reading is taken. This is repeated until the E.M.F. reading becomes nearly constant, or corresponds to a pH of about 12.5.

Plot the E.M.F. or pH readings as ordinates against the volume in ml. as abscissae. The end point is taken as the point of maximum slope of the curve and can be selected readily by inspection (Fig. 2).

$$\frac{\text{ml. at end pt.} \times \text{normality factor} \times 561}{\text{weight of sample} \times \text{per cent total solids}} = \text{KOH number}$$

Although the KOH number is not dependent upon the concentration of the ammonia present during the titration of the latex some authorities *(4, 6)* recommend that the ammonia content be adjusted to .2% on all samples before determining the KOH number in order to give a sharper end point. This is done by the addition of formaldehyde to neutralize the excess ammonia.

Surface Tension

Of the methods available for determining surface tension the ring method is simplest in manipulation and most readily adaptable to work with latex. The results by the ring method are reasonably accurate when attention is paid to the important corrections required for interpretation of the experimental data *(7)*.

The instruments which are used for measuring surface tension by the ring method all consist in principle of a torsion, spring or chainomatic balance (see Fig. 3). The determination consists in measuring the maximum pull on a ring when the ring is wet by the liquid and then slowly raised until it is detached.

There are many sources of experimental error in this determination but their importance can be minimized by observing certain precautions. The care of the ring is particularly important. After each determination it should be cleaned in chromic acid solution, washed and then heated to red heat in the oxidizing portion of a Bunsen flame. Care should be taken that any salts or latex have been removed from the ring before flaming or serious damage may result. The ring must be perfectly round with the wire all in one plane and should hang in such a way that it is accurately level.

The sample to be tested should be placed in a dish with a diameter of 7 cm. or more with some provision made to protect the surface from evaporation to the air. This is particularly important in the case of latex because the tendency of this material to "skin over" may increase the observed surface tension by several dynes. A fresh surface should be used for each measurement.

Materials having a high viscosity do not attain their equilibrium surface shape in a reasonable length of time so some difficulty is encountered in obtaining reproducible surface tension results on concentrated latex. Therefore, it has been desirable to make surface tension measurements on concentrated latex after diluting to a standard condition such as 40% total solids and 0.5% ammonia.

The surface tension is calculated from the total pull on the ring according to the following equation *(7)*:

$$\gamma = \frac{PG}{4\pi R} F$$

where P is the total pull in grams on the ring, G is the acceleration due to gravity, R is the radius of the ring, and F, the correction factor, is a function of $\frac{R^3}{V}$ and $\frac{R}{r}$. V is the volume of liquid raised by the ring above the free surface and is equal to the total pull in grams divided by the density.

Therefore $\frac{R^3}{V}$ is equal to $\frac{R^3 d}{P}$. $\frac{R}{r}$ is the ratio of the radius of the ring to the radius of the wire from which it is made and its value is generally given by the manufacturer. Harkins and Jordan *(7)* have published tables of correction factors (F) for various values of $\frac{R^3}{V}$ and $\frac{R}{r}$ from which a correction curve for any particular ring can be constructed. Failure to apply the correction factor may give results as much as 3 or 4 dynes in error.

Correction Factors (F) For The Ring Method

R^3/V	$R/r = 50$	52	54	56
1.00	.9290	.933	.936	.939
1.10	.9217	.925	.929	.933
1.20	.9154	.920	.923	.927
1.30	.9097	.914	.917	.921
1.40	.9043	.909	.913	.916
1.50	.8995	.904	.908	.912
1.60	.8947	.899	.904	.908
1.70	.8906	.895	.900	.904
1.80	.8867	.891	.896	.900
1.90	.8831	.888	.893	.897
2.00	.8798	.884	.890	.893
2.10	.8768	.881	.886	.890
2.20	.8738	.879	.883	.887
2.30	.8710	.876	.880	.884
2.40	.8680	.873	.878	.882
2.50	.8651	.870	.875	.879
2.60	.8624	.868	.872	.877
2.70	.8598	.865	.870	.874
2.80	.8570	.862	.867	.872
2.90	.8545	.860	.865	.870
3.00	.8521	.858	.863	.868

Copper

The presence of small quantities of copper and manganese in latex may have a serious effect upon the aging qualities of films. A sensitive test is needed therefore for each of these elements in latex and compounding materials. Colorimetric methods for detecting these substances are generally satisfactory.

Sodium diethyldithiocarbamate is a very sensitive reagent for determining copper. Special precautions are taken in the determination to prevent interference from iron.

Weigh about 5 grams of the dry film into a 58 mm. wide form crucible and ignite in a muffle oven at a dull red heat to a white ash. Cool and take up the ash with about 1 ml. of hydrochloric acid and a drop of concentrated nitric acid. Evaporate to dryness on a water bath and take up the residue with distilled water.

Treat the aqueous solution with 2 grams of citric acid and a drop of phenolphthalein, and add ammonia until a red color is produced. To this solution add 10 ml. of a 0.1 per cent aqueous solution of sodium diethyldithiocarbamate. Extract the brown solution with successive small portions of carbon tetrachloride until the extract is only faintly yellow.

Carry out the same steps on 1 ml. of a standard copper solution (1 ml. = 0.0001 gram of copper) from the point where the citric acid is added.

A blank determination on all materials must be run in exactly the same way as the sample.

The extracts are made up to volume and the colors are compared in Nessler tubes or a colorimeter and the amount of copper is estimated.

After the color has been developed and extracted, it is important that the solutions not be left for a long time before comparison is made, as the color fades slowly.

Manganese

The periodate method for manganese has been used with much success. The test consists of oxidizing the manganese to permanganate and comparing the color developed with a standard.

Weigh about 5 gms. of the latex film into a large porcelain crucible and ash in a muffle furnace at as low a temperature as possible.

Add 5 to 15 gms. of potassium bisulfate to the ash (depending on how much ash is present) and fuse cautiously until effervescence ceases, then put into the muffle at moderately low red heat, and fuse until the carbon particles are burned off.

Cool, dissolve in 80 ml. of 5 per cent sulfuric acid, filter if necessary, add 5 ml. of 85 per cent phosphoric acid and 0.5 gram of periodic acid, and heat until the color appears, boiling 15 minutes thereafter. Cool, dilute to 100 ml. in a volumetric flask, and compare with a standard in a colorimeter or Nessler tube.

The standard solution is prepared by diluting carefully standardized 0.05N potassium permanganate to such a volume as to contain 0.02 mg. of manganese per ml. with distilled water which has been slightly acidified with sulfuric acid, boiled with a little periodic acid, and then cooled.

Hydrogen Sulphide

The presence of hydrogen sulphide in latex may lead to serious contamination if the material is brought into contact with iron. The formation of ferrous sulphide produces a dark grey discoloration or a heavy sediment which reduce the quality and usefulness of the latex.

For most purposes a qualitative test for the presence of hydrogen sulphide is all that is required. When a quantitative determination is desired, the method described by Lachele *(8)* for use in the analysis of foods has been found satisfactory.

The test consists in distilling the hydrogen sulphide out of the sample in an atmosphere of nitrogen through a moistened lead acetate test paper. The color produced on the lead acetate test paper is then compared with previously prepared standards.

Coagulum

The coagulum present in latex is determined by filtering a sample diluted with a soap solution through an 80-mesh sieve and weighing the retained material.

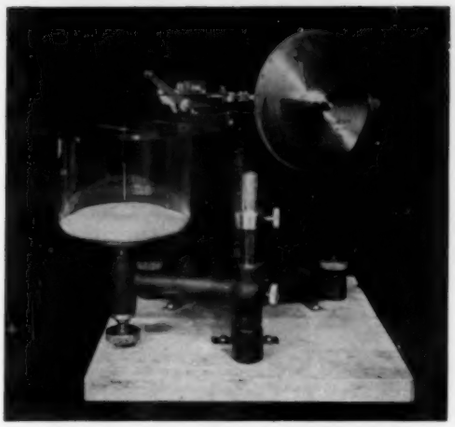

FIG. 3—Cenco-DuNouy Tensiometer.

Weigh about 100 gms. of the sample and dilute with a 2 per cent sodium oleate solution until it has the consistency of normal latex. Cut a circular piece of 80-mesh wire screen cloth of such a size that it will fit inside a 5 cm. (2-inch) ordinary pipe union. Weigh and place tightly in the union and press down in the center so that the upper surface will be concave. Clamp the pipe union in a vertical position. Pour the latex through the screen and wash with a 2 per cent sodium oleate solution and finally with water. Remove the screen, dry, and weigh.

When a large amount of coagulum is expected, a much smaller sample should be used.

$$\% \text{ coagulum} = \frac{\text{weight of dried coagulum} \times 10000}{\text{weight of sample} \times \text{percentage total solids}}$$

Sediment

A satisfactory method for determining sediment consists in centrifuging a sample of the latex, removing the supernatant liquid, washing the settled material, and weighing. However, certain precautions must be taken to insure correct and reproducible results.

An optimum time of centrifuging must be decided upon and consistently adhered to. The time will depend on the dimensions and speed of the centrifuge. A time factor of fifteen minutes has been found satisfactory for a machine running at 3,000 r.p.m. with a distance of 8.5 cm. from the center of rotation to the top of the sample, and with a sample depth of 10.5 cm. With a machine of other dimensions a comparable time can be estimated by the following formula:

$$T \text{ in minutes} = 15 \frac{(3000)^2}{N^2} \times \frac{\log \frac{X + Y}{Y}}{\log \frac{10.5 + 8.5}{8.5}}$$

where X is the depth of the sample, Y is the distance from the center of rotation to the top of the sample, and N is the r.p.m. of the centrifuge.

The wash solution must be one which will not coagulate the latex. Further, the density of the wash solution must closely approximate the density of the sample in order that material settling out of the sample will also settle out of the solution. A solution containing 20% alcohol and 1% ammonia meets these requirements satisfactorily.

Centrifuge 50 ml. of the latex for the specified time. Carefully siphon off the supernatant latex to not less than 1 cm. above the top of the sludge using a glass

tube drawn out to a capillary about 1 mm. in diameter. Add enough of the alcohol-ammonia mix to make the volume up to 50 ml. Stir the sediment up and recentrifuge. Repeat the washing and centrifuging until the wash solution is clear. Transfer the sediment to a Gooch crucible, wash, dry, and weigh.

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Nitrocellulose Rubber Varnishes

NITROCELLULOSE and chlorinated rubber do not form a homogeneous mixture when simply blended together in solution, but can be satisfactorily blended in the presence of a drying or non-drying oil if the chlorinated rubber is first dissolved in the oil by gentle heating, according to an item in a recent issue of the *American Ink Maker*. A method for dissolving the chlorinated rubber is given, as follows:

To 200 grams of linseed stand oil, heated to 110° C., are gradually added 100 grams of chlorinated rubber with stirring and the temperature raised gradually to 135° C., the whole operation requiring about an hour. A non-drying oil, such as castor oil, may also be used, except that in this instance the temperture must be raised much more gradually and the heating continued for a longer time.

A solution of these oil-chlorinated rubber products is said to be miscible with a solution of nitrocellulose in common solvents to form a lacquer or vehicle which dries to a homogeneous film. The finished products are said to be much more adhesive to any surface than coatings made from either component alone. Important applications for the finished products are seen in quick drying printing inks especially.

Mineralite Filler

A NEW inert, low gravity, micaceous filler is being offered to the rubber industry for use in hard rubber goods, molded articles and white rubber products by the Mineralite Sales Corporation, 9 Rockefeller Plaza, New York City. Called "Mineralite," the new filler can be used to replace hard rubber dust in the manufacture of hard rubber products, tests indicating a 25 to 50% increase in tensile when using equal amounts of Mineralite and hard rubber dust.

The new filler is available in fine mesh, and, according to the manufacturers, it readily disperses with the compound, gives a satisfactory finish, aids in quicker cure by 10 to 20%, increases durability, and acts as a stock lubricant. It is also claimed that it will assist in flow of molds of irregular pieces, making a good joint between Mineralite stocks and regular hard rubber stocks.

Dicalite Fillers for Rubber

ALTHOUGH widely adapted for use in all types of rubber products, the Dicalite fillers made by the Dicalite Company, of New York and Chicago, have found their most extensive use to date in mechanical rubber goods. These fillers are uniform, finely divided, fluffy powders, consisting of friable, amorphous particles. Their actual specific gravity is 2.05 to 2.20, depending on the grade, while the apparent specific gravity varies from 0.112 to 0.16. The loose weight varies from 7 to 10 pounds per cubic foot.

Other physical properties of these fillers include a refractive index of 1.40 to 1.48; porosity or voids from 70 to 90%; good wetability; and low conductivity of heat, sound or electricity. Although they are not affected by acids or solvents, they are slightly soluble in strong alkalis at room temperatures. According to the manufacturers, Dicalite fillers are easily incorporated into the rubber mix and improve the mechanical properties of the finished product by increasing toughness and resistance to wear and abrasion. In addition, they increase tensile strength, improve flexibility and elasticity, and aid in the color value of the finished product.

Four types are recommended for use in the rubber industry, designated as Dicalite RN, RO, RC and RF. Dicalite RN is a natural material, creamish gray in color, used in rubber goods where the color of the finished product is dark. Its loose weight is 9 pounds per cubic foot and it passes 200 mesh. Dicalite RO has the same characteristics of the RN grade with the exception that it is very much lighter in color, running almost to a white. Dicalite RC is pinkish buff in color. It has no ignition loss, is moisture free, and has a loose weight of 8 pounds per cubic foot. Finely divided, not more than 6% is retained on 325 mesh. The fourth grade, Dicalite RF, is also a finely divided material, white in color, for use in light colored rubber products as a filler and strengthening agent.

Method of Recovering Gasoline

LARGE volumes of gasoline vapor were being liberated to the atmosphere in an Eastern rubber goods plant because of the heat and pressure involved in the processing of a mastic. Not only was this a heavy wastage of gasoline but it constituted a real fire hazard. How more of the gas was recovered and the fire hazard reduced was revealed in a contribution to the contest conducted by *Factory Management* recently on cutting corners on production costs.

A study of the problem resulted in a plan to cover the processing vats with hoods connected to the large-diameter mains of a centrifugal compressor piping system. The pipe areas and velocities were figured to trap all the gasoline fumes, using room air as a carrying medium, and to maintain sufficient velocity to keep the vapors in suspension in the mains.

A condenser was installed in the line ahead of the compressor inlet to remove approximately 70% of the vapor, after which the remainder is compressed, providing static pressure to overcome the resistance of the absorption tower in the compressor outlet. The tower recovers the vapor still remaining.

The new system has increased the amount of recovered gasoline 260% over the amount recovered by former methods, saving approximately $60.00 per day, in addition to reducing the fire hazard occasioned by large amounts of gasoline vapor in the atmosphere.

Anti-Percussion Latex Films

Some Suggestions for the Use of Latex Films or Coatings for the Protection of Goods in Transit and a Few Others

By P. Mabb

THE established uses of rubber latex in the manufacture of paint and kindred products have included distempers, in which it is employed as a binder, brushing paints in which it is used as an addition agent to improve brushing characteristics, the tacky adhesives employed on tapes and papers for sealing or masking purposes, and adhesive varnishes for veneering purposes, *e.g.*, securing decorative cellulose acetate sheet to plywood backing. There has been no major application, except the lining of chemical plant, for media which are in effect rubber latex emulsions themselves.

Special Latex Media Developed

Recently, however, such rubber latex media have been developed, and although they are too new an innovation to make any complete claims for them, they possess certain specific advantageous characteristics which have been assessed, while others such as durability under service conditions have been established within certain circumscribed limits. Within the period which has been available for testing these products since their inception, it has been established that satisfactory serviceability can be obtained for specific types of duty, but present knowledge is insufficient to predict what additional durability may be securable under other conditions of usage.

Consequently, the following notes on these rubber latex media, while based on practical experience within the above mentioned limitations, cannot deal exhaustively with the subject. Their purpose is to create incentive in other users, who may have interest in other directions, in order that a clear delineation of the properties of latex media can be established in the same manner that has already been achieved with other paint materials.

An outstanding application for latex paints of the type under discussion is the provision of coatings on glass, the films so applied having effective anti-percussion qualities. The possibilities of these films applied to numerous types of glass windows and articles for their preservation under conditions of shock, transit or storage are immediately evident. It is important, however, in order to obtain fullest advantage from their use, and to prevent their misuse, that as complete an appreciation as possible of the properties of both the liquid media and of the applied coatings, their limitations as well as their merits, and their manipulability or restrictions in application, be soundly understood.

Compositionally, latex media differ fundamentally from all other paint preparations. In effect they are aqueous emulsions of rubber, strongly alkaline in reaction due to an ammoniacal constituent. Hence they can therefore be corrosive, and this must be borne in mind with respect to plant, *e.g.*, spray guns, used in their application to materials to which applied, as well as to plant, machinery or articles with which inadvertent contact may be made during application. Again, the ammoniacal odor may be offensive or even detrimental to operators, and may necessitate, where conditions of application are confined, the use of respiratory masks.

Returning to the compositional aspect, the latex media are generally very heavy-bodied, and respond to atmospheric temperature fluctuations rather markedly, becoming almost gelatinous under very cold conditions. This is a feature to be borne in mind in storage, and in drawing material from a cold store for application in a warmer atmosphere; reasonable approach to controlled temperature conditions is desirable for spray application if uniformity of coating is to be achieved. With regard to "total solids" or film-forming constituents, these in latex media are of the same order as in ordinary paints or enamels, and consequently, coverage will be of similar order for equal thickness of film. For example, typical values are as under:

	Total solids.	*Volatile carrier.*
Black latex paint	50.5%	49.5%
Natural translucent latex paint	53.4%	46.6%

As for all paint finishes, latex coatings are most effective when applied to clean surfaces. A general swab over with water for windows is generally sufficient. In engineering factories, however, care must be taken to clean any grease or oil off where it occurs. Also in chemical localities, acidic condensates must be removed.

The latex media can be applied by brushing or spraying. The latter method is to be preferred and should be adopted on every possible occasion, for reasons of better flow, smoother coating, speed of working and easier control in building up a coat to required thickness. It has been pointed out that spray equipment must resist the corrosive attack of ammonia.

Aluminum Recommended for Parts

Aluminum is recommended for all parts where practicable; tinned steel can be employed for pipe-line connections, stainless steel for diaphragms in pressure containers, and monel metal for gauges. Coppers and brasses are detrimental. Not only do they readily corrode and would tend to discolor opal latex, but traces of copper in rubber have been proved to cause rapid deterioration in service.

Obviously, the nozzle size of the gun, and pressure of application, must depend upon the job in hand. In general, however, the heavy nature of these materials renders a specially developed gun having a large nozzle

Note: This article is reproduced from the August, 1939, issue of *Plastics*, London, England.

aperture, and operated at high pressure (70/80 lb./sq. in.), the most efficient, rapid and economic. The medium is preferably not gravity fed from a cup container but pressure fed from pressure tank at 5/7 lb./sq. in.

Especially are these conditions the best for spraying windows, for which a flat fan-type spray setting with gun about a yard away from the work is best; windows at any angle can be sprayed. After use, guns and lines must be rinsed through with weak soda or ammonia solution for cleansing.

In practically all applications, the preferred procedure is to achieve coating by a single spray. This is readily possible with proper equipment and technique. The thickness that can be built up without "runs" depends not only upon the medium, but also on spray pressure, distance and nozzle size, as well as upon the angle of the object. While some manufacturers supply latex media for single-coat applications, but which may be used for successive coatings if desired, others provide a special latex primer which is first applied exceedingly thinly, and which is white and, therefore, only suitable as an undercoat to black (or opaque) latex.

The heavy latex coatings suggested as anti-percussion coating on window glass are 0.004 in. to 0.008 in. thick, corresponding to covering capacities of the media of 200 to 100 sq. ft. per gallon of medium. This corresponds to a dry weight of film of the order of ¾ oz. per sq. ft. For straightforward spraying of windows with the equipment advocated, spraying rates of 5 to 8 sq. ft. per min. can be achieved; with smaller spraying equipment, disproportionately slower speeds result.

Drying times are from one to 24 hours, depending upon the ambient temperature, humidity, and locality, as well as upon the particular latex media employed. In the case of the material for which primer is first used, the maximum period which need be allowed for the primer to dry is an hour, while, if necessary, the film coat may be applied immediately.

FIG. 1—Bricks thrown through this window, coated with "latex" on the inside, resulted in holes and circumferential cracks.

Regarding anti-percussion qualities, these were tested on ⅛-in. window glass sprayed one side with single coats of latex media, actually using an ordinary aerograph plus model gun, No. 3 nozzle, 40/50 lb. air pressure. The thickness of film applied averaged 0.004 in. for the black latex and 0.005 in. for the natural. After 24 hours, each glass panel was tested without mounting in a frame by supporting freely from two opposite edges, latex face downwards, and dropping a 2-lb. spherical weight through a distance of 6 ft. on to the center of it.

Effect on Latex-Coated Glass

Untreated glass, of course, just shattered into countless fragments which flew in all directions. The effect on the latex-coated glasses was amazing and could be readily studied because virtually no shattering occurred. The blow resulted in a tiny central hole, numerous radial cracks or fractures, as well as two or three circumferential cracks. In effect, the ball forced its way almost instantaneously through the glass panel, and the resilience of the rubber coating restored the glass to its original position.

A larger central hole was noted in the black latex covered glass panel, due to greater falling away of the glass. After fracturing, either of the two latex covered panels could be handled from the edges without glass falling away from the rubber. For purposes of comparison the weight was dropped on a panel of ¼ in. wired glass. This held together no better than the latex samples and actually evidenced considerably more splintering and shattering at the center and along the fractures.

During an aerial attack by an enemy bomber at night (for example) it will be essential that complete obscuration of light should be effected. Most methods employed for this purpose will treat the inside of windows. This will be effective only in so far as artificial light is obscured, but there still remains the grave danger of the feasibility of reflected light from large areas of glass due to the moon or incendiary fires. It is not necessary to mention the various possible methods by which obscuration can be obtained, but no doubt in many cases paint will be used for this purpose.

Apart from securing a complete black-out, there is also the question of providing a protection against blast and avoiding the possibilities of casualties from glass splinters which may be projected a considerable way into the building. The anti-percussion qualities of the latex paints have already been referred to, and, therefore, from this angle they afford a suitable means for providing an effective medium both for obscuration and anti-percussion.

Most of the work which has been carried out on these latex paints has referred to their properties on exposure to indoor conditions, but if they are suitable for outdoor application then they will be of very much greater service as an anti-air raid precaution. Moreover, it would be possible to effect economies during war time by the use of the translucent quality if external applications could be made in conjunction with suitable folding shutters fixed to the inside of the windows for black-out purposes.

The following tests indicate that the latex paints will provide a reasonable service life under external

atmospheric conditions; they have been conducted in a town atmosphere on a site closely adjacent to a railway and siding of one of the main-line goods depots. The most damaging condition to which the latex film may be exposed would be probably strong sunlight in dry weather, and to estimate the behavior of the film under these conditions, a window facing S.W. was selected and operations conducted with both black and translucent latex paints.

Apart from being subjected to the effects of the sun, the films were exposed to impingement from smoke and steam from passing rail traffic, as well as fumes from factory exhaust systems and boiler equipment. At the end of four months' exposure no detrimental effect could be observed on any of the films. A further test consisted of spraying roof lights on which a considerable amount of sediment from the atmosphere settled as well as being in a position in which they are subjected to the driving rains from the N.E. These lights have been under test also for a period of four months and no detrimental effects are observed.

Unless there is an unforeseen rapid deterioration the conclusion from the results of these tests is that these films would be serviceable for considerably extended exposure. In view of the data already provided with regard to spraying speeds, it can be seen that the use of these paints as an exterior protection against anti-percussion will not prove to be inordinately expensive. Moreover, they can be applied rapidly at short notice; any areas that may become mechanically damaged can be repaired by over-spraying without removal of the existing coat. Stocks can be held available because the media are stable for at least 12 months. Again, the latex coatings can quickly and effectively be removed by peeling off by hand, leaving the window clean.

In concluding, a more optimistic note might be struck. Shipment of pictures and valuable glassware offers a sound practical application of this material. Another packing problem concerns chromium-plated bumpers which have more economically been coated with latex for mechanical protection in shipment, and stripped before assembly, than wrapped in paper and hessian.

Results of Additional Tests

The characteristics and main advantages of latex paints have been outlined, and the method of application, together with their possibilities for industrial uses. Their ability to act as an anti-percussion agent as well as for obscuration in the black variety may be even more readily appreciated from an examination of the illustrations shown in Figs. 1 and 2. Figure 1 shows a window which has been coated by brushing over the inside of the glass with "Jatex" supplied by Jeavons, Tinto and Co., Ltd., of London, England. The other photograph depicts a window to which has been stuck translucent paper. At both of these windows several bricks have been thrown, the distance from the window to the point from which the bricks were thrown and the force used was, as far as could be controlled, the same in each case.

No comment is necessary to stress the superiority of latex paint in this test in preventing splinters of glass being scattered to the danger of the occupants. The value of latex paint in A.R.P. (Air Raid Precautions) for the ordinary householder is thus obvious, anti-percussion security is largely obtained against "blast" and with the transparent variety no serious inconvenience of loss of daylight is caused, while the black variety ensures a "black-out."

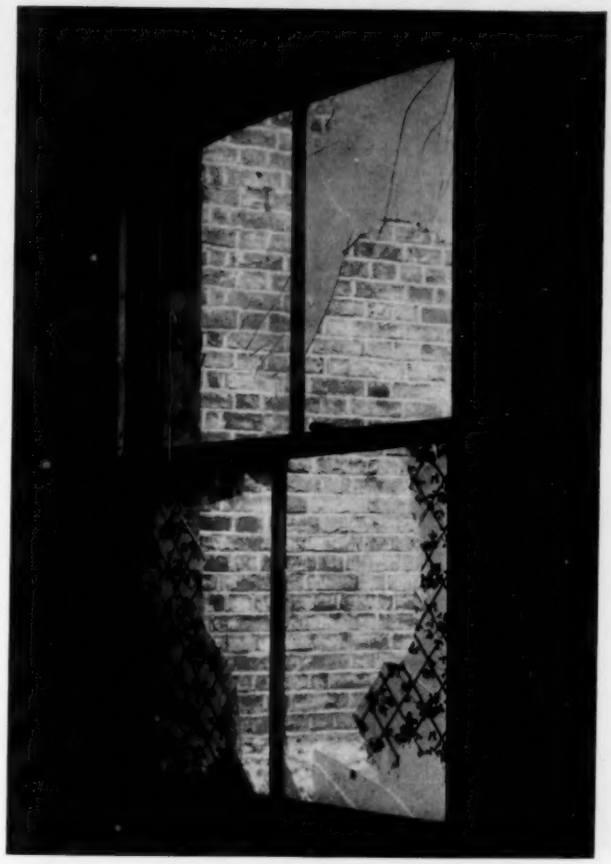


FIG. 2—Although translucent paper was stuck on this window, it did not prevent glass from shattering in all directions.

Addenda

Since publication of the aforegoing article in *Plastics*, a number of additional anti-percussion preparations have come to light. One of these is "Protec," an improved latex compound, developed by Dr. H. J. Stern, and introduced by Mason Products, Ltd., of Northolt, Middlesex, England. This preparation contains a very high content of dry rubber and is specially compounded to resist the deteriorating effects of heat, light and oxygen. Practical tests are said to have demonstrated the ease with which the deposited film can be removed from glass and other surfaces should this prove necessary.

An important improvement initiated by the manufacturers in the preparation of the new anti-percussion material is the use of a matt finished sealer or binder which is said to protect the latex film and increase its life up to two years. It is reported to be quite economical to use, although more expensive in initial cost than straight latex preparations, one gallon being sufficient for 40 square yards. The tensile strength of the film is 3,500 lbs./sq./in., and its elongation point is 800%.

"Protec" can be brushed or sprayed, although spraying is recommended by the manufacturers. It is most important that the latex should not come into direct contact with copper which promotes rapid oxidation of the latex. The new preparation is available not only in the neutral shade, but also in black, dark blue and other colors. The dark blue is said to be particularly popular as it enables a certain amount of light to filter through in daytime and yet blacks out interior lighting at night.

Constant Control Rubber Thread Covering Machine

Machine Winds Two Coverings of Yarn Around Rubber Thread in Opposite Directions to Produce Balanced Covered Rubber Yarn

By H. B. Ahlberg and C. E. Buote

H. & B. American Machine Company, Pawtucket, R. I.

A MACHINE to cover a rubber thread with two coverings of yarn, wound around a rubber thread core, in opposite directions from each other so that the finished covered rubber yarn will be in perfect balance, has been developed. Known as the H & B Constant Control Rubber Covering Machine, it is the result of several years of development, and is believed to be the most advanced in its field. It will cover both light and heavy rubber, and is single sided with 40 deliveries. Either beam or spool feed and either reel or tube take-up can be furnished.

Some of the outstanding features and improvements in the new machine are depicted in the accompanying illustrations. Fig. 1, a front view of a laboratory model with 6 deliveries, illustrates the spool feed and the tube and reel take-up. Fig. 2, a view of the foot end of the same model, shows the motor drive, variable speed drive, cylindrical cam drive for traverse motion, and the take-up drum drive. Fig. 3, the head end, shows the specially developed H & B variable speed drive, reel drive, feed wheel, drive drum, and the lower corrugated feed wheel drives. The function of these, and other mechanisms, will be discussed.

The new method of covering the rubber thread is shown schematically in Figs. 4 and 5. The feed spool of rubber indicated in Fig. 4, driven at a constant speed by the drive drum by means of friction, unwinds a strand of rubber upward through the center of the lower rotating spindle, and is covered by a wrapping of yarn just above the bullet. The yarn then moves upward through the center of the upper spindle which rotates at a slower speed in the opposite direction from that of the lower spindle and is wrapped with another layer of yarn of the correct number of turns to give a properly balanced covered rubber yarn.

The covered rubber yarn is then drawn upward by the "Sure Grip" tension device (Fig. 6) at a constant rate, then through the guide to the take-up drum to be wound on the tube. The yarn guide is fixed to a traverse bar which moves laterally back and forth a distance equalling the length of the tube package. The difference between the linear speeds of the feed wheel of the tension device and the drive drum determines the amount of elongation.

The process indicated in Fig. 5 is the same as that just described, except that rubber is drawn from the beam by a positively driven lower corrugated wheel and fed upward through the spindle. Instead of being taken up by the combination of a take-up drum and tube, it is wound on a revolving reel.

In the operation of the spool feed, the spool is held against a drive drum by spool guides whose center of gravity falls between the axis of the spool and the

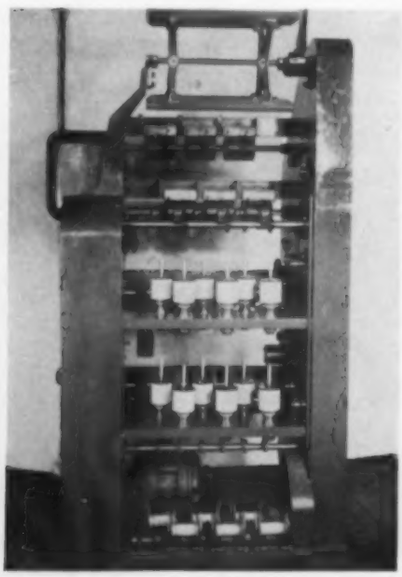


FIG. 1—Front view.

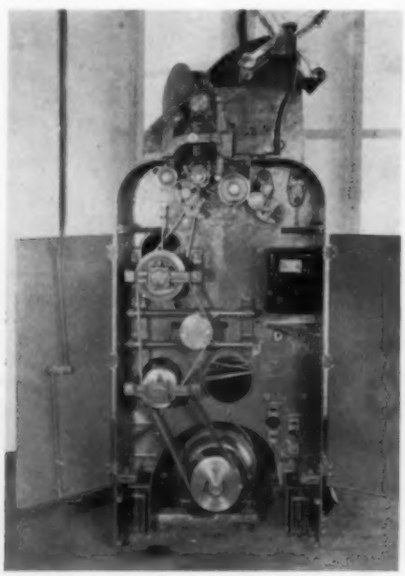


FIG. 2—Foot end.

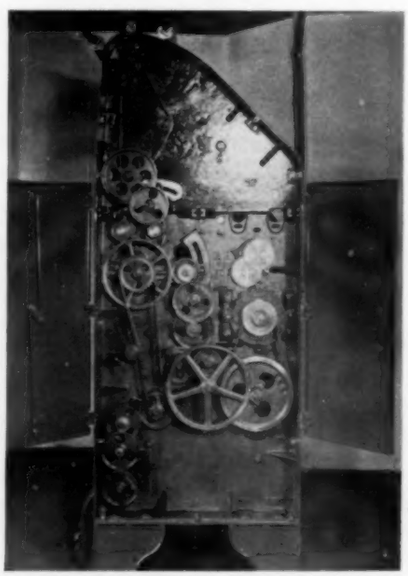


FIG. 3—Head end.

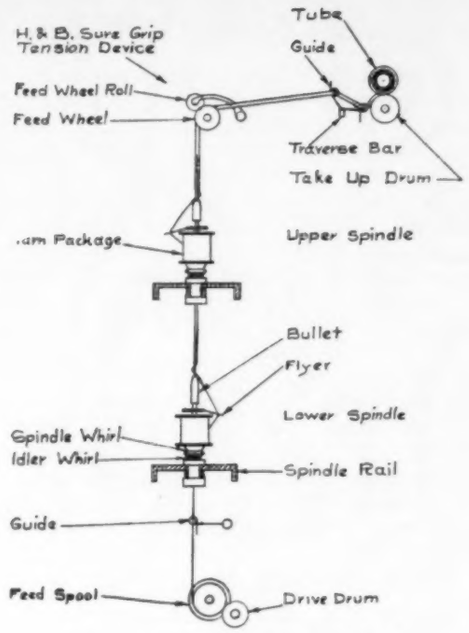


FIG. 4—Spool feed and tube take-up.

drive drum. The force exerted against the drive drum by the spool is constant to insure a constant delivery. As the spool decreases in diameter, or becomes lighter, the spool guide falls inward, increasing its pressure against the drum to offset the decrease in the weight of the spool.

The mechanism controlling the motion of the traverse rod and the take-up drum drive is simple, the movement of the traverse rods and arm being controlled by a cylindrical cam.

One of the important features of the Constant Control Rubber Covering Machine is that the covered rubber yarn for a specified elongation is perfectly balanced for the entire package run. This is accomplished by means of two variable speed drives. One of these, an Allis Chalmers Vari-Pitch Drive, at the foot end (Fig. 2), controls the speed of the upper spindles in such a manner that the rubber core with one wrapping of yarn about it, coming through the upper spindle, receives the outer wrapping of yarn in the proper directions with the proper amount of twist, resulting in a perfectly balanced yarn.

The second variable speed drive is one developed by our engineers. During the package run on a rubber covering machine the diameter of the yarn package decreases, resulting in less yarn being removed from the package per revolution of the spindle. Under this condition, a variation in yarn construction is obtained, a variation which is definitely not desired. This condition is corrected by the specially developed H & B variable speed drive (the action of which can be noted from Fig. 3). At predetermined intervals, depending on the yarn construction, the speed of the upper spindles will be decreased by adjusting this variable speed drive.

The action of this drive is, briefly: a turn of a handle in either direction, through a gear, turns an annular ring gear, causing the ball bearing housing and an adjustable sheave flange to slide in or out on the shaft to increase or decrease the pitch diameter of the sheave. The shaft, the fixed flange, and the adjustable sheave flange rotate as a unit. The adjustable sheave flange and the shaft are lubricated with grease through an Alemite fitting screwed to the end of the shaft. This fitting is slotted laterally through the threads on one side so that no pressure can be built up inside of the shaft and force the grease along the shaft to sheave surfaces. The ball bearing is oil lubricated.

The spindle of the new machine is designed to run at high speeds for various size packages. It is driven by an elastic band and has incorporated in its design both ball and needle bearings to insure smooth and vibrationless running and low power consumption. The spindle is cushioned to the spindle rail by a cork washer and a spring in order to eliminate shock and vibration which may be caused by starting the machine and by unbalanced packages.

The blade is made from a special steel and is heat-treated so that any undue shock will not affect the physical characteristics or cause misalignment. A vulcanized fibre whirl is furnished with each spindle so that in the event of a rubber or yarn break the elastic band can be shifted from the working whirl to an idler whirl in order to stop the spindle and piece-up the break.

The spindle package holder is rather unusual in its design. The time required to change packages of the same size or from one size to another is kept to a minimum. With a special adapter it is possible to use a range of 3- to 5-inch long yarn packages. The tube of yarn is held at both ends by two flanges, each having four prongs. The two flanges are held together by means of friction, created by flat springs, bearing against the internal wall of the adapter. Where smaller packages are concerned, the adapter is removed and the hub is assembled to the blade. The aluminum bullet is held to a stud by a spring clip, and is easily removed for flyer changes. The bobbin flange is made of molded Bakelite to insure a smooth serving edge for the yarn passing over it.

Another important feature of the new rubber covering machine is the "Sure Grip" tension device, previously mentioned. This device, developed by H & B

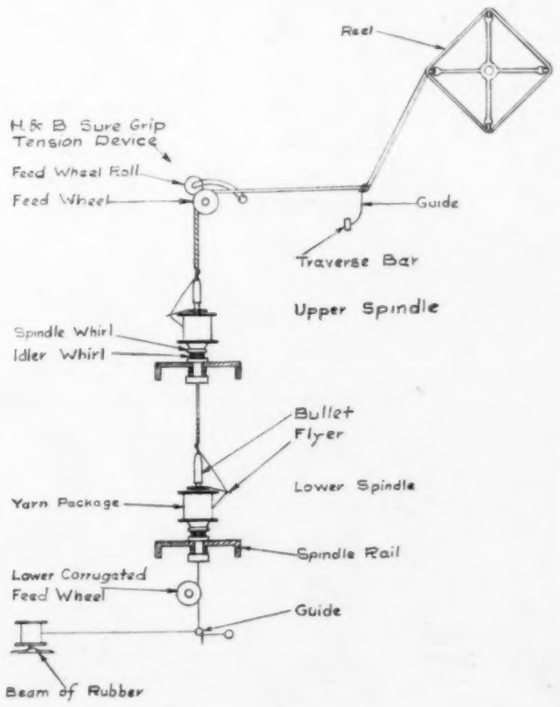


FIG. 5—Beam feed and reel take-up.

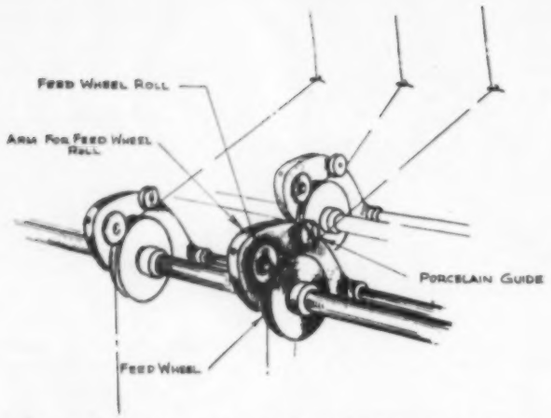


FIG. 6—Schematic drawing of "Sure Grip" tension device.

engineers, does not allow the covered rubber yarn to slip as it advances through the spindle to the reel or tube. As indicated by Fig. 6, it is essentially a grooved feed wheel, positively driven, and a small weighted feed wheel roll, which runs on the covered rubber yarn in the groove of the feed wheel. For threading, this device aids materially in speeding up the piecing-up operation and eliminates the old method of wrapping the yarn around two wheels.

Still another new development is an Airflo Flyer designed for smooth running operation which eliminates the accumulation of fly to the wire where it is fastened to the fibre. This flyer has improved the quality of the yarn and has reduced the number of yarn and rubber breaks.

As for the general construction of the machine, the head, foot ends, and intermediate samsons are made of cast iron of extra heavy cross section to eliminate vibration. The feet are adjustable by means of a jack screw for easy leveling. The drive shafts are supported in ball bearings mounted on cast iron angle beams. Spindle rails are made of cast iron channel. All the spur gears are accurately cut and made with an extra wide face. Change gears for the bottom and top feeds, and the reel gear, are interchangeable. All gearing at the head end (see Fig. 3) is easily accessible.

Synprowax

A SYNTHETIC product, designed to replace Montan Wax in rubber compounds and other preparations, has been introduced under the name of Synprowax by the Synthetic Products Co., Inc., London Road at Euclid Avenue, Cleveland, Ohio. The chief advantages of the new material over Montan Wax are said to be in the ease of dispersion in rubber compounds and in its having a lighter color. The physical properties of the two materials are described as being so close that it is difficult to note the difference between them after curing.

The physical properties of Synprowax are: melting point, 85° C.; acid value, 23.4; saponification number, 78.5; solubility in naphtha for 1 hour at 30° to 60° C., 67.20%; alkalinity, none. It is available in both lump and granulated form. According to the manufacturers, Synprowax was developed to meet the demand in this country for a substitute material to replace one of those difficult to import at present due to conditions abroad.

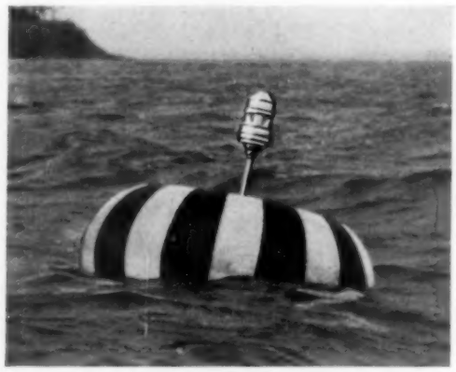
Seadrome Contact Light Buoy

THE recent development of a new seadrome contact light buoy will make night seaplane take-offs and landings as safe as those conducted on land, according to both civil and naval aeronautical authorities. These buoys, or markers as they are termed, are placed in lanes in a seadrome landing base to mark the runway. When a plane comes down, even though a heavy swell is running, the pilot will see two rows of greenish lights and will glide down between them.

The difficulty in the past has been the fact that lights would not remain stationary, plus the fact that the type of lights used cast a reflection in the water, thus making it impossible for the pilot to accurately judge the runway. The new markers, developed by Firestone Tire & Rubber Co. and Westinghouse Electric & Mfg. Co., in cooperation with the Civil Aeronautics Authority, are anchored permanently to the bottom of the landing basin, and consist of a new type of rubber float which causes the light to remain practically motionless under any agitated conditions. Moreover, the manner in which the light is diffused eliminates reflection.

The most important feature of the new light buoy is the specially designed large rubber float. This float presents no danger to the hull of the flying boats or to the pontoons of seaplanes should they crash into it. Surface craft, too, suffer no damage from contact with it while in motion. Exhaustive tests conducted by the U. S. Navy have proved this safety feature. The float is marked with broad vertical chrome and black stripes, impregnated into the rubber, to catch the eyes of fliers in the day time.

The light buoy weighs 185 pounds in all and is approximately 4 feet in diameter. The light itself is on the upper end of a pipe, three feet above water level, the pipe extending from the rubber float. Power is supplied by dry-cell batteries in a water-proof metal case at the bottom of the pipe under the water. These



View of the new floating light buoy.

batteries require servicing only once every three months or so. Enclosed in a prismatic or fresno lens, the light is a fluorescent or gaseous electric light bulb. The covering lens is clear but the light ray is greenish in color.

Tested and accepted by the U. S. Navy, the new light also has important significance in commercial night flying over water. At present, the Civil Aeronautics Authority permits no commercial seaplane landings or take-offs at night except in emergency situations. Now that the Navy, however, has accepted the markers, it is expected that the C.A.A. will soon pass on their feasibility for night commercial operations.

Conveyors for Oil-Treated Coal

Neoprene-Covered Conveyors for Handling New Fuel Found Necessary to Overcome the Effects of Oil

ALTHOUGH oil-treated coal is a comparatively new type of fuel its many advantages have already led to its widespread adoption by power plants all over the country. These plants have found that the spraying of coal with oil results in a fuel which has a better b.t.u. transfer than the fuels previously used; that is, immediate combustion is better so that a higher percentage of the heat is released in the furnace. In addition to this definite advantage, oil-treated coal aids in the elimination of dust, and reduces the possibility of spontaneous combustion in the coal pile as the oxidation rate is decreased.

Belt-Conveying Problem Introduced

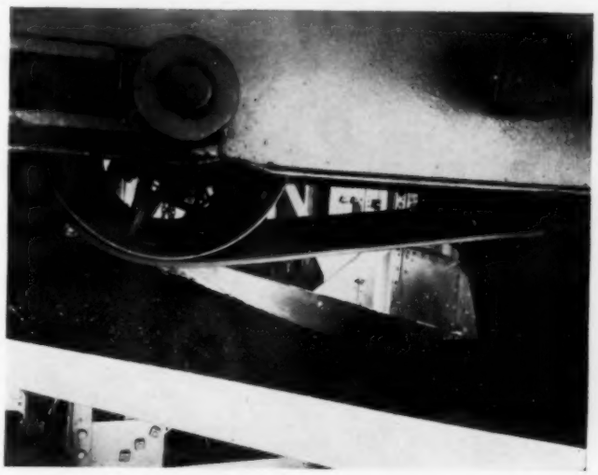
Considering these many advantages it would appear that the simple substitution of oil-treated coal for other types of fuel would solve a great many of the power engineer's problems. This is true but as is usually the case when changes are made the use of oil-treated coal introduces a new problem which must be solved before its advantages prove profitable.

One important problem created by this new fuel was the need for new materials handling equipment. Other types of coal were efficiently handled by rubber-covered conveyor belts which gave trouble-free service for years. But when rubber-covered conveyors were used with oil-treated coal a serious problem developed.

For example, the Stamford Gas & Electric Co. was using a rubber-covered belt which had a capacity of 100 tons per hour. This belt carried 5/8 slack 230 feet up a 12-degree rise. Trouble started with this belt almost as soon as the switch was made to oil-treated coal. The belt softened so that it wouldn't track; it slipped; it stretched, changing the tension and consequently shortened the life of the belt so it had to be tightened at regular intervals; and the oil-softened cover was easily abraded by the coal.

Finally, after five months the belt cover swelled to such an extent that the belt humped up and dumped the coal off the sides. All of these difficulties were caused by the oil in the coal. Only seven quarts are sprayed on each long ton, yet the conveyor belt cover absorbed so much of this oil that after five months' use oil could be squeezed out of the rubber.

Naturally it was important that such conveying difficulties be eliminated if the user was to get full value from the use of the coal. So Stamford Gas secured a neoprene-covered conveyor belt and installed it in this difficult location to see just what service it would give. This service test produced results which more than justified the faith placed in the new belt. The neoprene conveyor belt did not soften and slip; it did not stretch and it did not hump up as it was not swelled to any extent by the oil. A basic characteristic of neoprene, DuPont's chloroprene rubber, is its ability to maintain its original properties even after long exposure to oil. This particular belt has now been in service for over a year and is still operating efficiently. The oil has not softened the neoprene cover.



The above reproduction indicates how the coal gets between the pulleys and the belt and is ground on the surface.

The abrasion resistance of the neoprene belt cover when subjected to exposure to oil is emphasized to an even greater degree at another location in the plant. Here the coal is automatically weighed for delivery to the boilers. In the weighing system coal is delivered from a hopper to one end of a neoprene-covered conveyor belt. This seven-foot belt then carries the coal to an automatic scale which stops the delivery each time 300 pounds of coal are delivered to it.

The belt in this installation had a neoprene cover even before the switch to oil-treated coal. This cover was selected because of the heat in the location. The hopper is adjacent to the boilers. But heat is not the only factor tending toward the destruction of these belts. They are subjected to very severe abrasion. First, the hopper delivering coal to the belt holds seven tons and the pressure of this coal drags on this belt at every rotation. Second, coal gets between the pulleys and the belt and is ground against the inner surface.

Belt in Use for Two Years

Despite this severe abrasion, the neoprene belt delivered satisfactory service for a year before the plant switched to oil-treated coal. And now for another year it has resisted the effects of abrasion despite the possible deterioration introduced by the oil in the coal. It is still in good condition and is probably good for several more years' service.

Both of these conveyor belt applications have proved the ability of neoprene-covered belts to deliver efficient service under severe conditions. But the use of oil-treated coal has emphasized the advantages of neoprene. Now the swing to oil-treated coal is being accompanied by a similar swing to synthetic rubber conveyor belts so that the user may get the most efficient use out of his fuel.

Plasticized Resin Sheets

CALENDERED sheets of "Vinylite" plasticized resins, which are said to have many of the advantages and few of the disadvantages of leather and rubber, have been developed by the Carbide and Carbon Chemicals Corp., a unit of the Union Carbide and Carbon Corp., New York. These sheets are also said to offer possibilities for numerous applications heretofore not achieved by the plastics industry. The material, suitably plasticized co-polymers of vinyl chloride and vinyl acetate, can be supplied colorless or in transparent or opaque colors.

The new, highly plasticized materials are flexible to the point of withstanding folding and repeated flexing. Elongations up to 250 per cent, with a tensile strength of 3,000 pounds per square inch are readily obtained. The sheets are unusually tough and show interesting elastic properties. Stretched appreciably, the sheets return slowly to their original dimensions.

Because of their unique decorative possibilities, strength and permanence, large quantities of sheeting of this material have already been produced for the manufacture of men's belts, wrist watch straps, garters, and similar articles. It is claimed that articles made of the plasticized resin last longer than articles of the usual elastics, leather, and other materials. Because of correct "feel" and suitable "give," articles of the new material require practically no adjustments over a period of months.

Regarding permanence, the new materials will not oxidize or crack, nor are they affected by mold or mildew. They are completely resistant to water and perspiration, and will not discolor or develop any odor from moisture absorption. Depending upon the plasticizers used, they can be made highly resistant to oils, greases, gasoline, and alcohol. The plasticized sheets are thermoplastic which permits an easy, permanent bond by means of a rapid heat-sealing operation.

The new materials are made in thicknesses ranging from film, approximately 0.003 in. in thickness up to almost any thickness desired. Stocks in thicknesses from 0.003 to 0.090 in. are available.

Tensile Properties of Compounds

IN order to determine whether the tensile properties of a rubber compound measured at high stretching rates offer any better indication of resistance to abrasive wear than the properties measured at the usual testing rates, Frank L. Roth and William L. Holt, of the National Bureau of Standards at Washington, D. C., recently developed a special apparatus for stretching ring specimens to rupture by means of a falling weight.

Tensile properties of the ring specimens were determined from a study of the position of the weight as a function of time. The position of the weight was recorded at equal time intervals on a paper tape of which one end was fixed to the weight. The tape was pulled through a spark gap as the weight fell. The timing of the sparks was controlled by a tuning fork. Specimens were stretched to the point of rupture in about one-half to three-quarters of a second. The work of extension was determined as a function of the elongation of the specimen from the instantaneous positions and corresponding speeds of the weight. Stress-strain relationships were then obtained from the work of extension.

According to a paper describing the apparatus in the November, 1939, issue of the *Journal of Research*, published by the Bureau, tests were made on a range of cures of each of four rubber compounds. One of these was a pure-gum compound, and each of the other three contained 25 volumes of a filler per 100 volumes of crude rubber. The three fillers used were channel black, soft black, and clay.

A comparison of these data with similar data for a rate of stretch which lies in the range of speeds common to the usual routine tests fails to show that the tensile properties measured at the high stretching rates offer any better indication of resistance to abrasive wear than the properties measured at the usual testing rates.

Piccoumaron and Piccolyte Resins

A NEW line of resins suitable for the rubber industry will shortly be offered by the Pennsylvania Industrial Chemical Corp., Clairton, Penna., under the trade names of "Piccoumaron" and "Piccolyte." The former is a series of coumarone resins which have been offered for a number of years to other industries and which are now being made available for use in rubber with the addition of a new low cost series to take care of the demand for dark colored resins.

The new Piccolyte resins are basically a type of pure hydrocarbon thermoplastic polymers. They have the inertness and other chemical properties of the coumarones but have a minimum of yellowing tendency. They are said to be even paler than W. W. Rosin and should make the production of light-colored rubber stocks easy. The Piccolyte resins, however, are available in a complete color range, from light to extra dark, and in liquid form, with melting points from 10° to over 120° C. The Standard Chemical Co., Akron Savings & Loan Building, Akron, will distribute the new resins in Akron and surrounding territory.

Neville Cyrene Resins

MODIFIED polysterene resins, under the name of Neville Cyrene Resins, have been developed by the Neville Co., Pittsburgh, Penna. Like the paracoumarone-indene resins, the new resins are hydrocarbon, thermoplastic polymers, non-saponifiable, resistant to water, acids, and alkalis, and soluble in aromatic hydrocarbons, but have high solvent retention as compared with low solvent retention. Where the coumarone resins are hard, brittle, non-elastic, and have excellent adhesion, the new resins are hard, tough, somewhat elastic, but do not have very good adhesion.

Cyrene resins are not varnish resins and are not compatible with drying oils. They show a higher degree of cohesion than coumarone resins, and exhibit exceptional freedom from tackiness. Three separate grades have been made available, having melting points 90-110°, 125-140°, and 145-160°, respectively. Their use is suggested by the manufacturers in such fields as adhesives and plastic molding compounds.

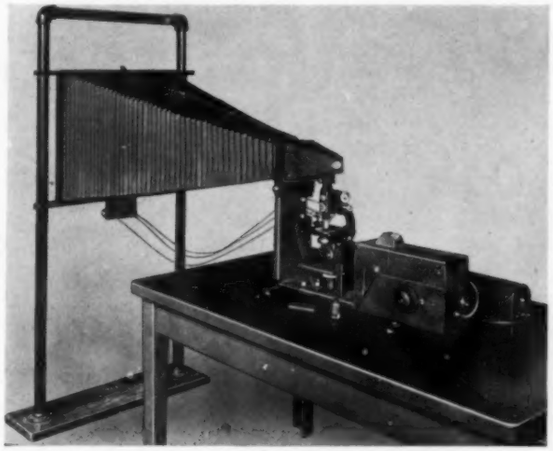
Rubber Wax No. 118

INCLUDED among the waxes made for the rubber and other industries by the Beacon Co., 89 Bickford St., Boston, Mass., is one designated as Rubber Wax No. 118. This wax is said to be finding extensive use for the coating of molded goods. According to the manufacturers, it gives a high gloss finish of good elasticity, without streaking. It is also said to be easy to apply and to dry quickly. It can be supplied in colors to order.

New Equipment

M.S.A. Microprojector

DESIGNED for use in determining particle size distribution and number concentration of impinger dust samples, and thus check on the performance of dust collectors, ventilating systems, etc., in rubber, paint, plastic, chemical and other factories, the M.S.A. Microprojector was recently introduced by the Mine Safety Appliances Co., Pittsburgh, Penna. It is said to greatly simplify this work by projecting an enlarged image of the microscope's field upon a ruled translucent screen. Instead of viewing the field through the eyepiece of a microscope with a magnification of 100 diameters, as is done in the



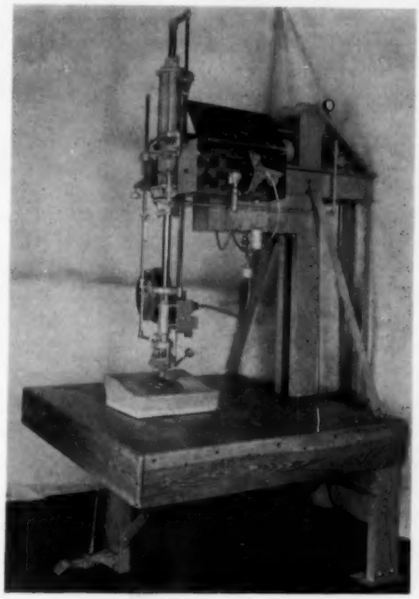
microscope method of counting, the field image is projected upon a screen 50 centimeters square, with a magnification of 1,000 diameters for counting and 10,000 diameters for particle size determination. The microprojection method of counting, according to the company, permits more concentrated samples to be counted without secondary dilution, and makes it possible to count samples more rapidly and with less eyestrain. It is also said to be easier to distinguish dust particles from pits, bubbles, etc., in the glass of the cells. The larger images of dust particles also permit a better estimate of particle size. The Microprojector consists of nine separate pieces of equipment. The only additional equipment necessary for its use is a standard microscope with condenser and 10X objective, a suitable support for the screen and frame, and a dark booth which can easily be constructed, details for construction accompanying each instrument.

Trutest Special Tire Gauge

BUILT on the direct-action principle, the Trutest Special Tire Gauge has been announced by A. Schrader's Son, 470 Vanderbilt Avenue, Brooklyn, N. Y. A dual-foot feature makes it practical for use on all types of wheel construction, especially dual-wheels. It has the swivel type indicating bar, distinctly marked on all four sides. Calibrations range from 10 to 60 pounds in 1 pound units, and 60 to 160 pounds in 5 pound units. The new gauge is streamlined and chrome plated. It may be used for checking the accuracy of other tire pressure recording instruments.

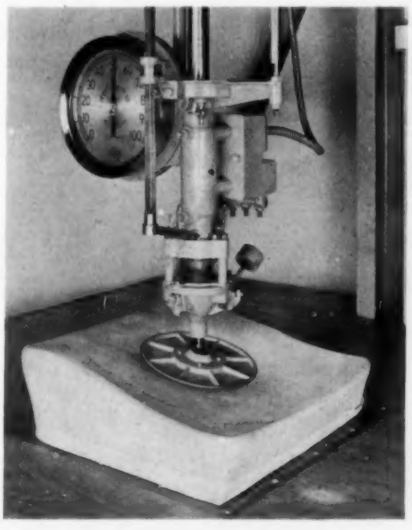
Foamed Latex Sponge Rubber Tester

DEVELOPED with the cooperation of the Foamed Latex Sponge Rubber Committee of the Rubber Manufacturers Association, the Henry L. Scott Co., Providence, R. I., has introduced a testing apparatus for foamed latex sponge rubber products, especially



Full View of New Scott Tester

cushions or mattresses, ranging in thickness from ½ to 18 inches. The working area of the table is 5 feet in length and 4 feet in depth. The framing of the machine is such that it is suitable for installation over a conveyor system. The mechanics of the machine are unusual in application. The hydraulic ram is operated by a manual latch intended for foot manipulation. A self-contained motor driven pump and oil reservoir



Close-up of Measuring Device

furnish the pressure for the ram operation. The speed of the ram before contact with the cushion is controlled at approximately 100 inches per minute. Mounted upon the lower end of this hydraulic ram is a closed circuit pressure measuring head recording the

resistance exerted by the cushion upon the 50 square inch area circular pivoted foot. At a one-half pound load upon the cushion, an automatic speed regulator engages and reduces the ram speed to 25 inches per minute. At this speed the ram further compresses the specimen automatically to a predetermined percentage of the total height. After this indentation has been reached, this machine automatically stops retaining on the dial indicator the pressure required for this effort. Mechanical means for recording this value could be installed if desired. The manual operation of this tester is extremely simple, being controlled by one foot treadle which, when depressed automatically locks throughout the entire working cycle. The resetting of the machine is accomplished by the unlatching of this one control. Full protection of the operator is assured in both cycles. The machine is very quiet and inexpensive to maintain. Its speed of testing from two to three units per minute is satisfactory for production line requirements. The net weight is approximately 1,400 pounds, illustrating the substantial framing intended to give continued satisfactory operation on routine control.

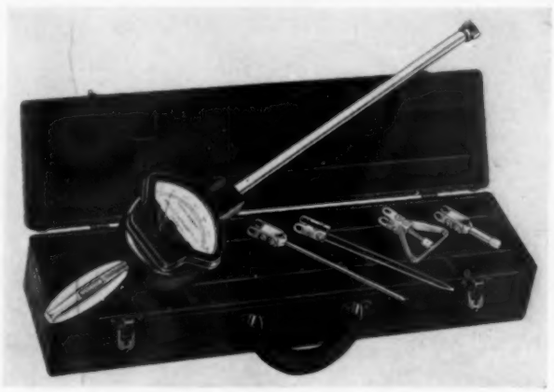
V-Belt Measuring Machine

A MACHINE which will measure all lengths of V-belts up to 40 inches under any tension up to 400 pounds was recently developed by the Howe Machinery Co., Passaic, N. J. Floor space occupied by the unit is approximately 1½ x 19 feet. Although originally designed for a belt manufacturer for use in his factory, the measuring device is also applicable for use by dealers and actual users. As Howe engineers point out, measuring and tagging belts at the factory is not entirely satisfactory, since there is usually a time lag between production and sale of the belts. Belts which may measure 200 inches in length when they leave the factory may vary from 198 to 204 inches at the time of sale due to expansion or contraction which may have occurred due to atmospheric conditions or other factors. If belts of varying length are used on the same sheave trouble is bound to occur since the tight belts pull more of the load than the others and the loose belts will have a tendency to whip and turn over in the sheave groove.

The measuring machine is so designed that any predetermined tension may be applied to the different sizes of belts while they are being measured. Two sets of sheaves are provided to take care of varying width belts.

All Surface Pyrometer Kit

AN all surface pyrometer kit, consisting of one pyrometer and all four types of surface thermocouples, *i.e.*, lava, bow, needle and general purpose



types, has been introduced by the Wheelco Instruments Co., 1929 South Halsted Street, Chicago, Ill. The complete kit weighs only 16 pounds. Wheelco pyrometers are equipped with detachable thermocouples so that a change from one thermocouple to another to accommodate the instrument to any type of surface can be quickly made. Other features of the instruments include a flexible thermocouple joint which can swing through 180°, and automatic cold junction compensation, hand wound coil and genuine sapphire jewels to assure accuracy. Of the thermocouples, the lava type is applicable to any flat surface, clean or coated, and is suitable for molds, platens, bearings, etc.; the bow type is used for curved surfaces of all shapes, such as calender rolls, drying rolls, and the like; the needle type, built with a sharp point, finds particular application in the temperature measurement of rubber surfaces, and of plastic materials and wax; the general purpose type is designed to meet all general temperature checking purposes, such as molten metals, oven type furnaces, etc.

New Type Recording Controllers

INCORPORATING three features said to be unique in instruments of the kind, a new series of potentiometer recording controllers has been announced by the Foxboro Co., Foxboro, Mass. These features are: an improved detecting mechanism, a new integral recording and control mechanism, and a new control system to provide maximum flexibility of use. Open-and-shut action or throttling action, with or without automatic reset, is available in the air-operated models of the new series. In order to obtain a more sensitive detecting mechanism than that required for recording (a requisite for good control action), a single, calibrated detecting cam is used. This cam will sense deflections of the galvanometer pointer of less than 0.0001 in. without lost motion. By positioning a friction roller, the cam positively determines the movement of the integral slide-wire contact, recording and control actuating carriage. Coordination of measuring, recording and controlling operations is achieved by an integral recording and control mechanism. The slide-wire contact, recording pen and cam follower actuating the control cam are assembled as a unit on the same rigid carriage. By employing an integral mechanism, the need for linkages, belts or gears to transmit the position of one unit to the others is eliminated.

Booklets, Catalogs, etc.

A New Scientific Method of Grading and Specifying Rubber Carbon Blacks. Godfrey L. Cabot, Inc., 77 Franklin St., Boston, Mass. 8½x11 in. 12 pp.

As indicated in the title, this treatise discusses a new method developed by Cabot technicians of grading and specifying carbon blacks used in the rubber industry. By this method, according to Cabot, it is now possible to review the significant characteristics of all rubber blacks manufactured, and to identify in unmistakable scientific terms the particular combination of properties of each black. Accordingly, the treatise presents an analysis of the numerous significant differences between rubber carbon blacks. In addition, there is a description of Cabot's new classification, which divides existing rubber compounding channel blacks into nine different grades, each with its own predetermined and calculable effects on rubber. Several tables and charts, giving the plasticity, resilience, tensile and modulus, heat generation, and other properties of various Cabot grades of black, are included.

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Government Contracts—Principles and Procedure. National Association of Manufacturers, 14 West 49th St., New York City. 8½x11 in. 32 pp.

The first complete study of business-government contracts ever made is contained in the November-December, 1939, issue of the *N.A.M. Law Digest* of the National Association of Manufacturers under the above title. The analysis outlines briefly the administrative procedure for entering into government supply contracts and the principal legal requirements and consequences of the contractural relationship established. Such factors as standard contract forms and typical provisions, laws which may be part of contracts, procedure for payment, and disputes and appeals are discussed. It is pointed out that if proposed amendments to the Walsh-Healey Government Contracts Act are adopted, manufacturers and suppliers having no direct contractural relationship with the government may also be affected.

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Asphalt Rubber Mixtures in Road Building. By J. A. Plaizier. Rubber Foundation, 182 Heerengracht, Amsterdam, Holland. 6¼x9¼ in. 36 pp. (A limited number of copies are available without cost from THE RUBBER AGE).

Reprinted from a recent issue of *I.R.I. Transactions* and based on a paper read earlier before a meeting of the Rubber Producers' Research Association (of England) this booklet discusses asphalt rubber mixtures in road building from two angles: first, the change of properties of asphaltic bitumen by the addition of unvulcanized rubber powder; second, application of bitumen-rubber powder mixtures to road construction. The various experiments conducted by the Rubber Foundation are separately described, with the results tabulated. In addition, the booklet includes the discussion which followed the presentation of the paper before the technical group referred to above.

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Why Penalize the Performance of the Modern Car With an Undersized Battery? National Battery Manufacturers Association, Inc., 2706 First Central Tower, Akron, Ohio. 4x8 in. 16 pp.

Because more than 25 electrically operated devices are found on the modern automobile, storage batteries which were suitable for cars 10 or 12 years ago are wholly inadequate today. In addition to the heavy current drain required for these accessories, modern improvements, such as the new sealed beam headlights, demand much greater electric power reserves than were formerly called for. Because of the importance of adequate power supply to satisfactory car performance this booklet has been published. It lists in table form current requirements of all accessories, in addition to other valuable data. Copies are available from the Association at a cost of 10 copies for one dollar, postpaid.

Collective Bargaining by United Rubber Workers. (Serial No. R 1000). Bureau of Labor Statistics, U. S. Department of Labor, Washington, D. C. 6x9 in. 14 pp. (Available from United States Government Printing Office, Washington, D. C.)

A reprint of the article in the September, 1939, issue of the *Monthly Labor Review*, published by the Bureau of Labor Statistics, this pamphlet discusses the rise of the United Rubber Workers of America, and then treats with the 50-odd contracts this union has with various rubber manufacturers. Specific points in these contracts are dealt with collectively, such as duration of agreements, union status and employment, wage rates and other pay provisions, hours and leave provisions, provisions for slack work, seniority, and settlement of grievances. It is, of course, of direct interest to every rubber manufacturer in this country.

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Footwear Compounding—Rubber and Neoprene. By A. J. Northam. Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. 6¼x9¼ in. 32 pp. (Report No. 39-7).

The use of DuPont rubber chemicals in rubber footwear compounding and the use of new types of neoprene, particularly Types G and GW, for oil resisting footwear, is discussed in this report. The recommendations for rubber footwear compounding do not differ greatly from previous ones (Reports No. 191 and 202), while the discussion of neoprene compounding is based on laboratory research supplemented by actual factory experience. A number of formulas are given, with some test results recorded.

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Audubon Metalwove Belts. (Catalog No. 50). Audubon Wire Cloth Corp., Richmond St. & Castor Ave., Philadelphia, Penna. 8½x11 in. 44 pp.

Numerous types of conveyor and processing belts which can be obtained in any ductile metal most resistant to various operating conditions are illustrated and described in this catalog. Various weaves, meshes and wire diameters are pictured which give numerous percentages of open area for the drainage of liquids or the circulation of air, gas or steam through these belts. Other types are shown which provide means for the safe handling and sorting, grading, sieving, classifying, etc., of various materials. Specifications for all belts are given.

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Plastic Gold. Reliance Rubber Co., Ltd., Chelsea, London, S.W. 10, England. 6½x8¼ in. 64 pp.

Issued in conjunction with the Golden Jubilee of the Reliance Rubber Company, this booklet, sub-titled "The Story of Rubber in the Service of Mankind," traces the history of the rubber industry from the discovery of "gum" by Columbus to the present day. Written in an interesting style, and cleverly illustrated with a number of pen-and-ink drawings, this booklet merits reading even by those closely connected with the rubber industry itself.

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The Proof of the Pudding. Bibb Manufacturing Co., Macon, Georgia. 6x9 in. 20 pp.

This is another in the series of booklets, pamphlets, etc., issued by Bibb to stress the advantages of its Heat Resistant Cord over other types of cord for use in tire manufacture. Claims made for strength, endurance and economy in this booklet are supported by accompanying results of recent tests. Further "proof of the pudding" is given by a number of testimonials from users of tires made with the Bibb cord.

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Royle Straining Machines. (Bulletin No. 410). John Royle & Sons, Paterson, N. J. 8½x11 in. 8 pp.

The various types of straining machines, built with herringbone gears, made by Royle are illustrated and described in this bulletin. New features built into the machines in recent years are stressed. Complete specifications for six different models are given. Brief reference to the company's line of extruding machines is also made.

Editorial Comment

Review and Prediction

RUBBER manufacturers can find little fault with the past year of 1939. Despite a nervous price structure and continual jousting for position in the tire replacement market, which developed in mid-year, and a poor start at the beginning of the year on the part of mechanical rubber goods, footwear, and other branches of the industry, 1939 was one of the best years for the rubber industry as a whole in a decade. Sales and production figures on tires and other finished goods were the highest since 1929.

Tire sales in 1939 will total approximately 56,000,000 units, as compared with 43,000,000 in the previous year. Original equipment tires will amount to 17,200,000, as compared with 11,500,000 in 1938, and replacement tires to 38,000,000, as compared with 30,500,000. Export sales remained at approximately 1,000,000 units. More pneumatic tires for tractors and other farm implement vehicles were sold than ever before.

Even though the mechanical goods branch of the industry got off to a poor start, the general improvement in business conditions, led by increased building activity, brought a welcome stimulus in the second quarter of the year. This boom continued throughout the balance of the year, and received added stimulus with the outbreak of European hostilities. The result of all this activity is an estimated increase in sales of mechanical rubber goods of at least 35% over those recorded in 1938.

Other branches of the industry fared equally as well, although increases in sales were not uniform throughout these branches. The footwear manufacturers, for example, increased their business materially, probably by about 20 to 25% over that of the previous year, with the improved condition attributed to new style improvements and the cold weather experienced in the latter part of the year. Every other branch of the industry also enjoyed a better year, although in most cases the high totals of 1937 were not matched.

As has so often been pointed out, rubber manufacturing is primarily a service industry, the rate of activity of which depends closely on what happens to the industries it serves. Therefore, predictions for 1940, or for any year for that matter, are very difficult, not to say dangerous. However, in light of the consensus of favorable predictions, it is safe to state that the rubber industry will enjoy continued prosperity, at least for the first half of the year.

This prediction is based on the following trends which are anticipated in the coming year: volume of industrial production, about 105 in 1939, should average 110; contracts for new building will be larger than those of any previous recovery year; automobile production will be within 10% of 1939; and imports will be considerably lower and exports considerably larger than in 1939.

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Cheaper Rubber

THE activity of research organizations associated with rubber growing efforts receives scant attention from the majority of rubber manufacturers. True, some manufacturers subscribe to and read journals concerned with rubber cultivation, and others glance through material referring to such activity brought to them by the regular journals they secure, but by far the majority take the raw material they use for granted and are concerned only with its quality and its price. Therefore, a recent announcement by H. J. Page, Director of the Rubber Research Institute at Kuala Lumpur in the Federated Malay States went almost unnoticed.

Mr. Page, in a recent talk explaining the work of the Institute he heads, said that cheaper rubber should be available for manufacturers, maybe as little as 6 to 8 cents a pound, delivered, in the years to come. He based this prediction on the marked success achieved from bud-grafted trees, derived from carefully nurtured clones. For example, the average yield of ordinary seedling rubber trees is approximately 400 pounds per acre; that from budded trees is 1,000 to 1,200 pounds per acre. Moreover, yields of 2,000 pounds per acre are anticipated. Those figures tell the story.

CURRENT • NEWS
of the Rubber Industry

JANUARY, 1940

Sale of Company to U. S. Rubber Is Approved by Fisk Stockholders

Despite Aggressive Activity of an Opposition Group Stockholders Approve Sale Recommended by Directors by Overwhelming Vote—Plants Are to Be Continued

SALE of the complete assets of the Fisk Rubber Corporation, with plants at Chicopee Falls and New Bedford, Mass., to the United States Rubber Company, previously recommended by 8 of the company's 10 directors, was approved by Fisk stockholders at a special meeting held in Wilmington, Delaware, on December 29. A majority vote was necessary. The final tabulation, compiled after twelve consecutive hours, showed 24,056 preferred shares and 280,617 common shares voting in favor of the sale, and 58,560 common shares and only 28 preferred shares opposed to it, a ratio of approximately 5 to 1. This result was surprising in view of the activity of an opposition committee, headed by Whitelaw Reid, former secretary and counsel of Fisk, whose allegations received wide publicity.

Under the terms of U. S. Rubber's offer for the Fisk properties, the price to be paid, besides the assumption of certain liabilities, is $6,827,330, plus 109,981 shares of U. S. Common stock, plus accrued dividend on the Fisk preferred stock from December 31, 1939, to date of redemption or other retirement not later than 32 days after the transfer is arranged. This breaks down to $110 in cash for each of the 35,277 preferred Fisk shares and $6.75 in cash, plus one-quarter share of U. S. Common stock, for each of Fisk's 439,553 common shares.

Fisk Plants to Continue

Another later development was the incorporated in agreement form, U. S. Rubber intends to operate the Fisk plants at Chicopee Falls and New Bedford, the latter a tire fabric mill, at increased capacity for the production of tires to be sold both under trade names now used by Fisk through Fisk's dealer organization, and also under trade names used by U. S. Rubber. The latter, however, assumes no legal obligation to operate either of these plants.

It is also believed that U. S. Rubber will maintain the present Fisk personnel with only minor changes. The agreement, however, provides for the termination of services of seven Fisk executives, with a total of $176,400 to be paid to these executives for such termination. These include Col. Charles F. Speaks, president, who will receive $100,000, and the following, who will divide the balance in varying amounts: R. C. Guy, treasurer; W. H. Benton, auditor; G. E. Whitelam, vice-president; and D. J. Brightman, H. R. Hurd, and A. D. Phillips.

In consideration for the payment of termination allowances, which will be assumed by U. S. Rubber, all of these seven executives have agreed to hold themselves in readiness to give advisory service to the new company on request, but not to such an extent as to prevent their taking employment elsewhere, whether or not competing with U. S.

The agreement also provides that after the transfer of assets Fisk will not carry on any business, other than proceedings to liquidate and wind up its affairs and distribute its remaining assets as designated, under the name of the Fisk Rubber Corporation, or any other name including the word "Fisk" and, if it shall carry on any such business whatsoever thereafter, it will immediately change its corporate name so as to eliminate the word "Fisk."

Goodyear or U. S. Rubber?

Acquisition of the Fisk interests by U. S. Rubber now makes it problematical as to whether U. S. Rubber or the Goodyear Tire & Rubber Company merits the title of the "World's Largest Rubber Company." On the basis of balance sheets of a year ago, Goodyear showed total assets of approximately $190,000,000. The addition of the Fisk assets to those of U. S. Rubber, based on a balance sheet of the same period, brings the latter's total up to approximately $194,000,000.

From the employee's point of view, an attorney for the United Rubber Workers of America stated that when Fisk actually becomes part of the U. S. Rubber organization the union will amend its present petition to be named as bargaining agent for employees of all U. S. Rubber plants in order to include the Fisk factory at Chicopee Falls.

Just prior to the meeting of Fisk stockholders at which the sale of the company to U. S. Rubber was given overwhelming approval, Thurman Arnold, chief of the Anti-Trust Division of the Department of Justice, issued a statement in which he said that the proposed merger was looked upon to be of doubtful validity in the light of the anti-trust laws. He also said, however, that in the event the merger was approved (as it has been) no criminal proceedings would be brought but that the requirements of anti-trust enforcement might be secured through civil action.

Several days later, on January 8, Representative Casey, Democrat, Massachusetts, demanded that the Department of Justice institute proceedings against U. S. Rubber "to the end that it may be dissolved into independent operating companies." He also asked that "direct action" be taken against Dillon, Read & Co., investment brokers, "for their collusive acts to eliminate the independence of the Fisk Rubber Corp." He firmly stated that his request was aimed at preventing absorption of Fisk.

Still Later Developments

Although only a majority of both preferred and common shares were necessary to approve the sale of Fisk to U. S. Rubber, a two-thirds vote was required to approve dissolution of the Fisk Rubber Corporation, a suggestion advanced by the company's directors, since after the consummation of the sale only a shell would be left.

No such number of votes could be mustered at the meeting on December 28, when the sale of the company was approved, and a second meeting was scheduled to consider dissolution on January 9. The latter meeting, however, has been adjourned until January 19.

Another later development was the filing of a petition in the Superior Court at Boston on January 9 seeking to halt the sale of Fisk to U. S. Rubber. The petition was filed by Anthony P. Massare, of Arlington, Mass., owner of 100 shares of Fisk common stock. It specifically requests an injunction against the sale, an order voiding the sale agreement, and the appointment of a master to appraise the assets of Fisk. The bill is returnable by February 5.

EXPORT TRADE SHOWS DECIDED IMPROVEMENT

Exports of rubber goods, which averaged $2,797,650 during the first six months of 1939, increased to $3,218,650 in August of that year, $3,630,650 in September, and $4,155,627 in October, according to figures just made public by the Leather & Rubber Division of the Department of Commerce, Washington, D. C. While the increased trade probably has resulted from a number of factors growing out of conditions prevailing in Europe, it is believed that hostilities abroad has been the principal cause of the enlarged exports.

On the whole the war has resulted in decided increases in shipments to the belligerent countries, despite a decrease in shipments in October. Exports to European belligerents were valued at $508,240 in October, $611,294 in September, $595,510 in August, compared with a monthly average of $222,892 between January and June, 1939.

Exports to Germany, which averaged $33,025 monthly during the first half of the year completely disappeared during October and those to France decreased from a $69,631 average for the months of the first half of the year to $27,671 in October. The high value attained by exports to the belligerents is to be explained by heavy shipments of hose made to the United Kingdom in connection with orders placed in this country early in the summer.

As these orders are now being completed, and as the value of exports to the United Kingdom of rubber manufactures other than those decreased from an average of $161,606 during the months of the first half of the year to $98,338 in October, the continuance of the present heavy volume of shipments to the belligerents is not assured.

Volume to Neutrals Increased

The volume of manufactured rubber goods going from the United States to the principal European neutrals increased sharply during the months of September and October. Shipments to the Netherlands advanced to $217,401 in October, a figure 178 per cent higher than the average for the first six months of the year. Exports to Norway were valued at $81,643 in October, or 103 per cent above the average for January to June, 1939, and those to Sweden amounted to $159,774, 12 per cent above the monthly averages for the first semester of 1939.

Exports to Denmark, valued at $18,466, were slightly above the average for the first half of the year. American rubber products cleared for Belgium had a value of $48,761 in October, which was in line with shipments throughout the year. The value of American rubber products going to Italy remained insignificant, the total for October being only $2,129.

Exports of rubber products to the British Dominions also continued upward during the month, attaining a figure of $617,241 in October, which was 30 per cent higher than the monthly average for the first half of the year. The larger part of these gains was made in shipments to Canada. Exports of rubber goods to that market were valued at $462,072 during October, 60 per cent over the average for the months of the first half of 1939.

The Union of South Africa continued as the second best customer among the Dominions with October exports totaling $106,522, a decrease of 41 per cent from September and 17 per cent from the average of the months of the first half of the year. Shipments to Australia increased slightly to $36,855 and those to New Zealand decreased somewhat to $11,792 during the month.

Exports to the larger Latin American countries had a value of $925,432 in October, the third successive month in which an increase was registered, the figure for October being 28 per cent over the average for rubber goods shipments to the same markets during the first six months of 1939. As compared with average shipments for the first six months of the year, exports to Brazil increased 78 per cent in October to $217,662; to Cuba, 42 per cent to $215,320; to Venezuela, 36 per cent to $121,586; to Mexico, 11 per cent to $111,240; and to Colombia, 10 per cent to $96,177. Shipments to Argentina decreased 11 per cent to $93,241.

It is believed that the increase in exports to Latin American countries results more from the desire of exporters to have their distributors well stocked than from immediate increase in distributors' sales there as a result of reduced competition from rubber goods of European manufacture. Considerations of transport have had some influence in this direction. Some quickening of business, however, has been noticed throughout this area.

Coming Events

Jan. 15-19. Annual Meeting, Society of Automotive Engineers, Book-Cadillac Hotel, Detroit, Mich.

Jan. 17. Rubber Section, Canadian Chemical Ass'n., McMaster University, Hamilton, Ontario.

Jan. 19. Akron Rubber Group, Akron City Club, Akron, Ohio.

Feb. 6. Los Angeles Rubber Group, Mayfair Hotel, Los Angeles.

Feb. 9. Chicago Rubber Group, Hotel Sherman, Chicago, Ill.

Mar. 4-8. American Society for Testing Materials, Annual Meeting, Hotel Statler, Detroit.

Apr. 11-12. Rubber Division, A.C.S., Hotel Gibson, Cincinnati, Ohio. (A. C. S. meets April 8-12).

Oct. 7-11. National Safety Congress, Stevens Hotel, Chicago, Ill.

CHEAPER RUBBER IS PREDICTED BY PAGE

Crude rubber should gradually become cheaper in the years to come, in the opinion of H. J. Page, Director of the Rubber Research Institute at Kuala Lumpur, F.M.S. Explaining the work of the Institute in a recent talk, Mr. Page stated that the propagation of high-yielding trees by bud-grafting and the study of clones grown under different conditions have advanced rapidly in recent years.

Results of great importance have been obtained from the work of breeding and the study of families of seedlings derived from high-yielding parent clones, he stated. As an example of the commercial importance of this work, he pointed out that whereas the average yield of ordinary seedling rubber trees is less than 400 pounds per acre, budded trees derived from good clones now available for commercial planting are capable of yields of upwards of 1,000 to 1,200 pounds. Still better clones, now in the process of development, will give yields of more than 2,000 pounds per acre.

Referring to rumors that some so-called synthetic rubbers may eventually be sold as little as 25 cents per pound, Mr. Page said that no such goal could be reached for many years to come, if at all. By such time, he intimated, rubber estates, with high-yielding planting material, will probably be producing rubber at an f.o.b. cost of 4 cents a pound or less, which could be profitably sold for 6 to 8 cents a pound if freight and other costs are kept down.

PAVING BLOCKS SHOW UNUSUAL DURABILITY

Sixteen years ago, installation of an experimental 10 by 12 foot section of rubber block paving was made by the Goodyear Tire & Rubber Company in front of its Akron, Ohio, factory. Current technical examination by company engineers showed that, despite heavy traffic, the rubber blocks had experienced but slight wear and looked fit for a second sixteen-year period of service.

The rubber blocks or bricks, each eight inches long, four inches wide, and four inches high, molded and compounded for abrasion and aging, have tongue and groove construction on their sides to provide security when fitted together in laying. They were laid on an eight-inch concrete base with a quarter-inch cushion of high-melting-point asphalt between the rubber and the concrete. One end and one side of each brick was painted with an asphalt emulsion.

The rubber paving block section located on busy East Market Street, a main thoroughfare of Akron is also directly in front of the trucking entrance to the main gateway of the Goodyear plant, where hundreds of trucks, heavily laden with tires and the materials from which they are made, pass over the section every week.

BATA SHOE PLANT TO CONTINUE OPERATIONS

Although Jan Bata, head of the international shoe manufacturing and distributing organization which bears his family name, known in this country as the Bata Shoe Company, threatened to terminate his building operations at Belcamp, Maryland, following the announcement on December 28 by James L. Houghteling, Commissioner of Immigration and Naturalization, that only 10 of the 72 Czechs brought to Belcamp to act as instructors of new employees in the new factory could be employed by the Bata concern, it is believed that operations will be continued.

According to Commissioner Houghteling, an investigation disclosed that there were "very few processes employed at the Bata plant which are not known to skilled American workers, and which might justify the importation of Czecho-Slovakian workers on the assumption that unemployed skilled American labor of the type required to perform these processes is not available." Permission to bring in 100 instructors had previously been granted to Bata, over the protests of American shoe workers' unions. The Czech instructors were allowed in on a one-year permit.

The Bata plant now employs approximately 750 workers, practically all of whom received instructions from the Czechs. The first unit, for which ground was broken on June 1, 1939, went into production on September 1. It is a five-story, 260 x 86 cement, brick and glass building. The second of a half a dozen similar units is now under construction. Present output is approximately 20,000 pairs of shoes a week.

INCREASED ACTIVITY WAS RECORDED IN 1939

Increased activity was recorded by practically every branch in the rubber industry in 1939, according to a review recently issued by A. L. Viles, president and general manager of the Rubber Manufacturers Association. The industry operated at a rate approximately 30% higher than in the preceding year.

The rubber industry employed more men in 1939 than in 1938, according to Mr. Viles. These men had practically full time employment throughout the year at wages about 20% above the average for all industries, so that total payrolls in the rubber industry during 1939 increased about 24% over 1938.

Discussing tire sales in 1939, the R.M.A. executive stated that final figures will reveal a total of some 56,000,000 units, as compared with 43,000,000 in the preceding year, or the largest volume the industry has enjoyed since 1929. Sales of original equipment tires rose from 11,500,000 in 1938 to 17,200,000, while replacement sales jumped from 30,500,000 to approximately 38,000,000. Export sales remained at about a million units.

Turning to other branches of the industry, Mr. Viles stated 1939 sales of mechanical rubber goods will show an increase of at least 35% over 1938, due in large part to the improvement in general business conditions which stimulated the trade, but they will not reach the 1937 level, which was about 50% higher than 1938. The growing popularity of foamed latex sponge rubber products, such as seat cushions and mattresses, was referred to particularly.

Rubber footwear companies increased their business materially, among other means through style improvements. Similarly, higher volume was shown by heels and soles, hard rubber, rubberized fabrics, rubber flooring, drug sundries, and other rubber products.

Profits for the industry will be somewhat higher in 1939 than they were for the previous year, Mr. Viles continues. He points out, however, that the rate of profit in the rubber industry has never been high, net profit averaging 4.9% on net worth in 1938, and 2.6% for the past 11 years. Factors mainly responsible for any profits earned in 1939 were listed as increased volume of business, relative freedom from labor troubles, and stability in raw material prices until the outbreak of European hostilities.

With regard to the industry's possibilities in 1940, Mr. Viles stressed the point that since rubber manufacturing is essentially a service industry, it is difficult to make any reliable forecasts. He said, however, that indications at present point to at least as large a volume in the coming year, with the exception of a falling off in replacement tire sales.

To Install Joint Fillers

Rubber joint fillers of an improved type, developed by the B. F. Goodrich Co., Akron, will be installed in the near future on two stretches of the Dixie Highway, near Daytona Beach, Florida. More than 30,000 feet of the fillers, which are of the pre-formed type, will be installed in all. The Florida contracts are said to be the result of successful test installations made by highway officials in Washington, D. C., Ohio, Indiana, Nebraska, and in other states.

SHIPMENT REACHES NEW BALTIMORE WAREHOUSE

Unloading latex from the tanker "Kota Pinang" at the Baltimore dock.

The initial shipment of latex from the Far East for the Goodyear Tire & Rubber Company's dock storage warehouse in Baltimore, Maryland, recently completed, arrived last month aboard the tanker *Kota Pinang*, and was unloaded for temporary storage before shipment in new, specially-equipped tank cars, to the company's Akron plants. The warehouse has six 30,000 gallon storage tanks, located in the upper section of the building, below which tank cars are placed to be filled by gravity from the containers above.

Cargo of the *Kota Pinang* was unloaded by a new portable pump unit that can be used either on the dock to pump the latex to a steel pipeline which lies under the dock flooring and along its edge, or can be lowered into the ship's hold to pump the latex into the pipeline and into the storage room. When the latex gets down to near floor level in the ship's hold, men, equipped with rubber squeegee paddles, push the residue into low spots so it can be raised by the pump.

The new latex tank cars, of which there are two, are built in standard railway tank car chassis, with special construction in the tanks themselves. These tanks, of 10,000-gallon capacity, are of steel, and are lined with 6-inch cork insulation and with a specially treated inside lining that has been painted with Goodyear's acid-resisting Pliolite, the rubber base paint, to withstand the action of the ammonia.

MANUFACTURERS ADOPT NEW TIRE WARRANTY

A new tire warranty, the result of intensive investigation by the Tire Manufacturers Division of the Rubber Manufacturers Association, to apply to tires used in non-highway or off-the-road operations, where they are subject to abnormal or unusually severe service conditions, has been adopted by the tire manufacturers. The standard warranty reads as follows:

"Every tire of our manufacture, bearing our name and serial number, used wholly or in part in non-highway or off-the-road service, such as earth moving, grading, excavating, quarrying, stripping, logging, graveling, lumbering, farm service, agriculture (including airplane, industrial pneumatic and solid tires), when used on rims conforming to the Tire & Rim Association standards, is warranted by us against defects in materials and workmanship.

"If our examination shows that any tire has failed because of such defect we will either repair the tire or make a reasonable allowance on the purchase of a new tire."

The interpretation of this warranty as applied to tires and tubes by all manufacturers is as follows:

"When tires used in non-highway or off-the-road service, such as earth moving, grading, excavating, quarrying, stripping, logging, graveling, lumbering, farm service, agriculture (including airplane, industrial pneumatic and solid tires), fail prematurely due to some imperfection in workmanship or material, the manufacturer will assume his responsibility as outlined in the warranty.

When such a tire is presented to the manufacturer for consideration, the manufacturer will determine the amount of service still remaining in the tire and the normal expectancy of the tire, which means the amount of service it would have given if it had not proved defective, and then figure the price of a new tire accordingly.

In figuring the replacement price the proportion of normal expectancy will be computed in fractions of ⅛, ¼, ⅓, ½, 2/3, ¾, etc.

For example—when a defective tire shows by its general condition that it has given about ½ the service it would have given had it not proved defective, the owner will be entitled to a new tire of the size and type at one-half price.

The question naturally arises as to how to arrive at the exact proportion of total service such a tire has given at the time of failure.

This will be determined by taking into consideration various factors such as—condition of bead, cord body, sidewall, tread wear, operating conditions, and the equipment on which the tire in question was used.

Then, in figuring the adjustment price, consideration will be given to the amount of service the tire actually gave as against the amount of service the tire would reasonably be expected to give had the tire not proved defective.

As in the case of automotive tires, when any part of such a tire fails, after it has given a reasonable amount of service, without regard to the condition of the other parts, that tire may be properly considered worn out.

Tires which are removed from service because of cuts and other injuries, are not subject to adjustment consideration under this interpretation. This also applies to tires used on rims which do not conform to the current recommendations of the Tire & Rim Association, Inc.

The above shall be the only basis for adjustment and no other guarantees or warranties, specific or implied, will be recognized by the tire manufacturer. Under no conditions shall such tires or tubes be warranted for any period of service, either hours, months, mileage, or otherwise."

Coloring Sandbags

In an attempt to brighten up the rather grim appearance of sandbags, many shopkeepers in London, England, as well as some industrial concerns, are having their sandbags sprayed with a green latex solution which gives them the appearance of grass mounds. This method has the advantage of protecting as well as improving the appearance of the sandbags.

O'NEIL, OF GENERAL, PREDICTS GOOD 1940

The coming year promises a continuation of the business activity that has marked the past few months, according to W. O'Neil, president, General Tire & Rubber Co., Akron, in a year-end statement. The past year was the best in the history of the company, he revealed.

"There should not be a drop of more than 5% in the total volume of tires in 1940 as compared to 1939," Mr. O'Neil said. "Moreover," he continued, "the expected increase in the heavier truck tire sizes probably will mean that the total tire tonnage in 1940 will be as great, or greater, than in 1939, in spite of a possible slight drop in units manufactured.

"While crude rubber has advanced in cost about 25 per cent, most of this increase is due to the extra cost of insurance on ocean freight, because of war conditions. It is not likely that the war will seriously interfere with the shipment of rubber from the Far East, and thus cause a rise in crude rubber costs, unless Japan should become involved in the European war, and this does not now appear to be imminent."

Akron Meets January 19

The next meeting of the Akron Group, Rubber Division, A.C.S., will be held on Friday, January 19, at the Akron City Club. W. L. Listerman, of the Federal Bureau of Investigation, U. S. Department of Justice, connected with the Cleveland office, will speak. Dinner will be served promptly at 7:00 P. M. Reservations can be made with T. L. Stevens, 2510 First-Central Tower, Akron, Ohio, secretary-treasurer of the Group.

Canada Meets January 17

A meeting of the Rubber Section of the Canadian Chemical Association will be held on January 17 at McMaster University in Hamilton, Ontario. Dinner at 6:30 P.M. will precede the meeting. J. E. Buchan, assistant factory manager of the Bakelite Corporation of Canada will speak on "Plastics." He will also show a sound film.

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N. Y. GROUP ELECTS HAYNES AND SOULE

Charles R. Haynes, of the Binney & Smith Co., New York, and K. J. Soule, of the Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J., were elected chairman and vice-chairman, respectively, of the New York Group, Rubber Division, A.C.S., at a meeting held at the Building Trades Club, in New York City, on December 15. Other officers elected were Peter P. Pinto (THE RUBBER AGE) as secretary-treasurer, and J. H. Carroll (R. E. Carroll, Inc.) as sergeant-at-arms.

Members elected to the Executive Committee to serve three-year terms included M. R. Buffington (Lea Fabrics), W. F. Tuley (Naugatuck Chemical), and D. A. Shirk (Rare Metal Products), while W. H. Grote (United Carbon) was elected for a two-year term. The Nominating Committee, whose selections were approved unanimously, consisted of R. D. Gartrell (U. S. Rubber) as chairman, and J. Miscall (Flintkote) and C. A. Bartle (DuPont).

Outside of the election of officers, the meeting, which was the Annual Christmas Party of the Group, was dedicated to fun and frolic. During dinner, entertainment was furnished by two accordionists, and after dinner the assemblage was regaled with stories by a professional jokester. Approximately 200 gifts were then distributed to holders of lucky numbers, all of which were made possible by donations from the following:

Admiar Rubber Co., Akron Standard Mold Co., American Zinc Sales Co., Anaconda Sales Co., Binney & Smith Co., Godfrey L. Cabot, Inc., Carter Bell Mfg. Co., Continental Carbon Co., E. I. du Pont de Nemours & Co., Endicott Johnson Corp., Farrel-Birmingham Co., Flintkote Co., General Atlas Carbon Co., Givaudan-Delawanna, Inc., C. P. Hall Co., J. M. Huber, Inc., Imperial Paper & Color Corp., *India Rubber World*, Monsanto Chemical Co., H. Muehlstein & Co., National Rubber Machinery Co.

National Sherardizing & Machine Co., Naugatuck Chemical, N. J. Zinc Co., Pequanoc Rubber Co., Philadelphia Rubber Works, Rare Metal Products Co., Revertex Corp. of America, THE RUBBER AGE, St. Joseph Lead Co., A. Schulman, Inc., Henry L. Scott Co., Somerset Rubber Reclaiming Works, Southwark Mfg. Co., Speed Fastener Co., Stamford Rubber Supply Co., C. J. Tagliabue Mfg. Co., Thiokol Corp., Thompson, Weinman & Co., Titanium Pigment Corp., United Carbon Co., R. T. Vanderbilt Co., Vansul, Inc., and Wishnick-Tumpeer, Inc.

Pioneer Adds Building

The Pioneer Rubber Company, Willard, Ohio, has added another building to its factory. The new building is 60 x 108 feet, one-story, of concrete block construction. It will house part of the dipping machines used by the company. A monorail system is being installed to facilitate the work.

NELSON AND SMART HEAD DETROIT RUBBER GROUP

W. G. Nelson
New Chairman of Group

C. F. Smart
Vice-Chairman of Group

Business and pleasure were combined at the Christmas Meeting of the Detroit Group, Rubber Division, A.C.S., held at Webster Hall in Detroit on December 15. Approximately 80 members and guests were in attendance. The meeting featured election of officers, presentation of a technical paper, a musical program, and the distribution of prizes and gifts.

At the business session, W. G. Nelson, of the Automotive Division, U. S. Rubber Co., Detroit, was elected Chairman of the Group for the 1940 season, and C. F. Smart, metallurgist of the Pontiac Motor Division, General Motors Corporation, Vice-Chairman. E. J. Kvet, chief chemist, Baldwin Rubber Co., Pontiac, Mich., was elected secretary-treasurer.

Other elections included that of Fred Wehmer (Minnesota Mining & Mfg. Co.) as Chairman of the Entertainment Committee; Al Fuhrman (Mid-West Rubber Reclaiming) as Chairman of the Membership Committee; and Sam Adinoff (St. Clair Rubber) as a member of the Executive Committee.

Speaker of the evening was E. F. Riesing, of the Firestone Tire & Rubber Co., whose subject was "The Use of Rubber for Vibration Dampening." The paper was very well received, and the author was subjected to numerous questions from the floor. An excellent musical program was heard during the course of the meeting as well.

A record of some sort was established at the meeting. Charles M. Baldwin, district manager of the United Carbon Co., with headquarters in Chicago, was in attendance. At 10 P. M. Mr. Baldwin left the meeting, boarded a plane for Chicago and arrived in time to convey the greetings of the Detroit Rubber Group to the Chicago Rubber Group which was holding its Annual Christmas Party and Ladies' Night the same evening at the Ivanhoe Gardens in Chicago. Not content to rest on his laurels, Mr. Baldwin also appeared at a party concurrently being held by the Chicago Paint & Varnish Production Club at the Svithiod Club in Chicago. On December 16 Mr. Baldwin advised that he was "resting peacefully."

Prizes and gifts distributed at the Detroit meeting were made possible by donations received from the following companies: American Zinc Sales Co., Baldwin Rubber Co., Binney & Smith Co., Chemical Products, Inc., Continental Carbon Co., E. I. du Pont de Nemours & Co., Edgewood Tool Co., Flintkote Co., Herron & Meyer, Johnson Rubber Co., Manhattan Rubber, Midwest Rubber Reclaiming Co., Minnesota Mining & Mfg. Co.

Monsanto Chemical Co., H. Muehlstein & Co., Naugatuck Chemical, New Jersey Zinc Co., Ohio Rubber Co., Pequanoc Rubber Co., Philadelphia Rubber Works, St. Joseph Lead Co., A. Schulman, Inc., Standard Chemical Co., Titanium Pigment Corp., United Carbon Co., Xylos Rubber Co., R. T. Vanderbilt Co. and Wishnick-Tumpeer, Inc.

CHICAGO GROUP HAS ANNUAL XMAS PARTY

The Annual Christmas Party of the Chicago Group, Rubber Division, A.C.S., with which was combined Ladies' Night, was held on December 15th at the Ivanhoe Gardens in Chicago. Approximately 200 members and guests attended. The entire evening was given over to social activities. Each of the ladies received a gift and door prizes were provided for the men. The gifts, prizes and refreshments served were made possible by donations from the following suppliers:

Akron Standard Mold Co., L. Albert & Sons, American Zinc Sales Co., Binney & Smith Co., Godfrey L. Cabot, Inc., Carter Bell Mfg. Co., Commerce Petroleum Co., Continental Carbon Co., Cleveland Liner & Mfg. Co., E. I. du Pont de Nemours & Co., General Atlas Carbon Co., Genseke Bros. Soap Co., Herron & Meyer, J. M. Huber, Inc., International Smelting & Refining Co.

Loeb Equipment Supply Co., H. Muehlstein & Co., Midwest Rubber Reclaiming Co., Monsanto Chemical Co., Naugatuck Chemical, New Jersey Zinc Co., Philadelphia Rubber Works, A. Schulman, Inc., Thiokol Corp., United Carbon Co., Van Cleef Bros., R. T. Vanderbilt Co., and Wishnick-Tumpeer, Inc.

FINANCIAL NEWS

SEIBERLING RUBBER INCREASES PROFIT

Net profit of $828,791 for the year ended October 31, 1939, which compares with $297,494 in the preceding year, is reported by the Seiberling Rubber Co., Akron, Ohio. Gross sales during the year totaled $10,896,543, an increase of 14% over those in 1938.

The statement reveals total current assets as of October 31, 1939, of $3,361,479, of which $524,859 was in cash, against total current liabilities of $1,155,698, a ratio of 2.9 to 1. Net worth of the company was put at $4,007,294, an increase of $1,578,924 over 1938, the major portion of the gain being attributed to profits earned and adjustment resulting from cancellation through purchase by the company of its entire issue of 6% Class A debentures.

Reference was also made to the dividend record during 1939. Cash dividends totaling $5.00 per share on the company's 18,675 shares of Class A preferred were paid during the year, in addition to a dividend equivalent to $43.75 per share on the 13,127 shares of Class B preferred, paid in the form of Class A preferred when pursuant to an approved readjustment plan the Class B was exchanged for the Class A.

"The only disappointing development during the year," said J. Penfield Seiberling, president, in a message accompanying the report, "was the outbreak again of repeated price-cutting on tires and tubes in the form of so-called 'special merchandising sales' fostered and aggressively promoted by some of the larger manufacturers." He attributed recent decreased retail and wholesale prices on tires and tubes, in the face of increased crude rubber and cotton costs, to the chaos caused by these special "sales," and predicted that despite recent moves a modest increase in prices will materialize in the near future.

A few days after the financial statement was issued, it was revealed that Seiberling Rubber had filed a registration statement for 28,000 shares of $2.50 cumulative convertible prior preference stock of no-par value and an indefinite number of its no-par common shares with the Securities and Exchange Commission. Although no offering price was stated, it was understood that this price will be filed later in an amendment to the statement filed.

The estimated maximum gross proceeds from the sale of this new stock were put at $1,400,000. The common stock registered will be reserved for exercise of the conversion privilege of the preference stock and for exercise of stock purchase warrants to be granted to the underwriters. The latter will receive warrants to buy 15,000 common shares on or before July 1, 1949.

Net proceeds from the sale of the new shares will be used to pay debts to two banks amounting to $140,546, according to the statement, and also to advance approximately $337,500 to the Seiberling Rubber Company of Canada, Ltd., to enable that company to pay bank loans. The balance will be used to increase the parent company's working funds.

FIRESTONE REPORTS NET OF $6,722,045

Firestone Tire & Rubber Co., Akron, reports a net profit of $6,722,045 for the fiscal year ended October 31, 1939, equal to $2.03 a common share, which compares with $5,258,041, or $1.27 a share, in the preceding year. The net was arrived at after providing for all expenses, including $7,146,535 for depreciation, $12,958,000 for direct taxes, and $1,650,000 for adjustment of current assets in foreign countries to prevailing rates of exchange.

The report reveals that sales for the year amounted to $160,119,022, the largest in the company's history, which represented an increase of 12.9% over sales of $141,882,681 for the year ended October 31, 1938. Net income before provisions for depreciation, taxes and adjustments on foreign currency amounted to $10,341,648. The consolidated balance sheet as of October 31, 1939, shows total current assets of $89,564,381, including $13,853,127 in cash and $29,376,883 in notes and accounts receivable, against total current liabilities of $15,113,823, of which $8,912,207 is for accounts payable and the balance for accrued taxes and other items.

In a statement accompanying the report, John W. Thomas, president, revealed that total planted area on Firestone's Liberia plantations amounts to 69,200 acres, of which 29,700 acres are now in tapping and an additional 8,000 acres will be ready for tapping during the coming year. Construction has been started on a hydro-electric development at the plantations which, when completed in 1941, will supply all power requirements and materially reduce costs. Most Liberian shipments are being made in the form of latex.

It was also stated that the tire factories which are now under construction in Bombay, India, and Sao Paulo, Brazil, each of which will have a daily capacity of 500 tires and tubes, are expected to be in operation early in 1940. Reference was also made to several new products developed by Firestone during the past year, including braided and knitted hose, a patented line of track blocks, and special bushings for tractors, trucks, tanks and other heavy vehicles. The expansion of the company's rubber tie plates into the railroad field, based on their successful application in subways, was predicted.

LEE RUBBER & TIRE REPORTS PROFIT GAIN

For the year ended October 31, 1939, Lee Rubber & Tire Corporation, Conshohocken, Penna., reports a net profit of $1,464,166, equal to $5.46 per share after the payment of a 25c stock dividend on October 28. This compares with net profit of $950,598, equal to $3.71 per share, in the preceding year. Lee's reports include the earnings of the Republic Rubber Division at Youngstown, Ohio. The 1939 net was arrived at after the deduction of $1,198,375 for Federal, State, County and local taxes.

Consolidated net sales for the year ended October 31, 1939, amounted to $14,520,701, as compared with $12,219,048 in the preceding year, an increase of 19%. Sales of Lee tires and Republic mechanical rubber goods were the largest in the history of the company. Current assets were shown at $7,794,674, including $2,865,150 in cash, and current liabilities at $1,525,877, including accrued taxes, a ratio of 5 to 1. Net worth was listed at $9,586,541, equal to $35.72 per share.

A. A. Garthwaite, president, in a report accompanying the figures, revealed that during the year a new power plant was authorized for the Republic factory where the company has been purchasing part of its power requirements. Installation of the new power plant will be completed during the first half of 1940, and it is expected to effect substantial savings. He also stated that the mortgage of $75,000 carried on real estate employed in retail store operations was paid off during the year.

Pharis Tire & Rubber Co.

Year Ended October 31: Net income of $499,123, equal to $2.27 each on 220,000 capital shares outstanding. Because of a change in the company's fiscal year since the last report, no exact comparisons are available. However, for the ten months ended on October 31, 1938, the company reported a net income of $455,000, or $2.07 a share. Sales for the year ended October 31, 1939, amounted to $9,257,642, an increase of 34% over those in the twelve months ended October 31, 1938.

Dayton Rubber Mfg. Co.

Year ended Oct. 31: Preliminary report indicates a net profit of approximately $780,000, after charges and taxes and provision for dividends of $2.00 per share on 46,518 Class A preferential shares outstanding. Total sales were estimated at $9,150,000. Indicated earnings should approximate $3.85 per share on the 176,670 shares of common stock outstanding. In the preceding year, the company reported a net profit of $472,548, or $2.15 a share.

Question: Where can we find a Who's Who of the rubber industry? Answer: Only in the 1939 RUBBER RED BOOK.

Names in the News

LLOYD R. LEAVER, associated with the Jos. Stokes Rubber Co., Trenton, N. J., for the past 18 years, has been advanced to the position of general manager of the Canadian plant at Welland, Ontario.

J. M. LINFORTH, associated with the Goodyear Tire & Rubber Co., Akron, in various technical and sales capacities since 1919, has been promoted to one of the vice presidencies of the Goodyear Tire & Rubber Co., Inc., the sales subsidiary. He once held the title of assistant to the president.

ERNEST W. BECK, safety director, U. S. Rubber Co., New York, addressed a meeting of the Blackstone Valley Safety Council at Manville, R. I., on December 19. He Discussed "Forty Thousand Reasons for Talking Safety."

HOWARD E. FRITZ, general manager, Koroseal Division, B. F. Goodrich Co., Akron, was the principal speaker at a meeting of the Dayton Association of Purchasing Agents, held at the Engineers Club in Dayton on December 14. He dwelt upon the advantages of the so-called synthetic rubbers.

W. H. STEVENS, formerly a partner in the firm of Henry P. Stevens & Son, consulting chemists to the Rubber Growers Association, Rubber Trade Association of London, and other organizations, has resumed consulting chemical practice in collaboration with DR. H. J. STERN. Offices are at 75 Chancery Lane, London, W. C. 2, England.

C. G. KIESS, associated with engineering activities for Westinghouse Electric, Williamsport Wire Rope, and other companies for the past 20 years or more, and more recently president and chief engineer of Industrial Inhibitors, Inc., has been appointed manager of the wire division of the National Rubber Machinery Co., Akron, Ohio.

T. G. SULLIVAN, formerly with Vansul, Inc., is now connected with the Harmon Color Works, Inc., 550 Belmont Avenue, Haledon, N. J., in the capacity of manager of the rubber color department.

W. M. COY, until recently director of research for the Wilson Sporting Goods Co., of Chicago, is now connected with the golf ball department of the United States Rubber Company in New York.

G. S. RANSHAW, who has been editing the *Rubber Age (of London)* for the past two years, has severed connections with that publication. No announcement of his future plans was made nor was his successor named.

A. M. FIALA, associated with the Akron Sales Division of the B. F. Goodrich Company since 1925, has been named product sales manager of the new Air-Cell Division of that concern. He will devote his time to sales of Goodrich's latex cushioning material.

FRANK H. IRELAN, former production manager of the Delco Products Division of the General Motors Corporation, and for the last several years general manager of the Delco Brake Division, has been appointed general manager of the Delco Products Division, succeeding CARL H. KINDL, recently resigned. B. A. BROWN, factory manager of Delco Products, becomes general manager of Delco Brake.

I. N. KIMSEY has been named manager, and R. A. CHARLTON, assistant manager, of the Akron Sales Division of the B. F. Goodrich Company. Both men have been with the company for a number of years.

GEORGE R. HILL, until recently associated with the Development Department of the U. S. Rubber Company at its Passaic, N. J., plant, has joined the rubber department of the research laboratories of the R. T. Vanderbilt Company at East Norwalk, Connecticut.

LYLE A. CLOUGH, formerly connected with the research and new products division of the Goodyear Tire & Rubber Company at Akron, Ohio, is now chief chemist of the Toyad Corporation, Latrobe, Pennsylvania, a new company making latex and latex sponge products.

MARK M. JONES, president, Akron Belting Co., Akron, Ohio, spoke on "Means, Ends and Trends in Administration" before a meeting of the New York Chapter of the Society for the Advancement of Management, held in New York City on January 9.

LEWIS LARRICK, research physicist, B. F. Goodrich Co., Akron, discussed methods of accurately measuring the hardness of rubber before a meeting of the American Physical Society, held in Columbus, Ohio, on December 30. His paper, entitled "The Hardness of Rubber and Other Highly Elastic Materials," showed that present measuring techniques often vary widely in their results.

Lockwood Joins R. M. A.

W. S. Lockwood, until recently director of the Crude Rubber Development Bureau, in Washington, D. C., which was established in October, 1938, by the British Rubber Publicity Association, of London, and which closed on December 31, 1939, became associated with the Rubber Manufacturers Association, Inc., 444 Madison Avenue, New York City, on January 1.

The Crude Rubber Development Bureau had been set up as a unit in the organization created under Article XIX of the International Rubber Regulation Agreement to promote research into and publicity for new rubber uses. The primary purpose of the Bureau's initial activities was the development of greater interest in "rubber on the farm," and Mr. Lockwood devoted a large number of speeches, radio talks and articles to this topic. Agricultural colleges throughout the country, farm and trade papers, and equipment manufacturers were visited frequently, and much attention was concentrated on the need for greater standardization of wheel sizes and interchangeability of agricultural wheels.

The Bureau suspended operations after mutual agreement with officials of the British Rubber Publicity Association that it was impracticable to maintain an organization in the United States under present international conditions.

From 1929 through 1938 Mr. Lockwood was in the foreign service of the United States Department of Commerce, stationed in Singapore, Batavia and London, respectively. In the Middle East he reported on rubber production from 1930 through 1932, visiting plantations in Java, Sumatra and Malaya. In London, Mr. Lockwood specialized in rubber trade reporting from 1935 through 1938.

JOSEPH R. KELLER, associated with the Black Rock Manufacturing Co., of Bridgeport, Conn., for a number of years as chief draftsman, was recently elected general manager of the company. He was also made a director of the company. D. H. AKER has joined the company in a sales capacity.

Los Angeles News

More than 200 covers were laid at the annual banquet of the U. S. Rubber Company Social Club in the Rainbow Room of the Mayfair Hotel, Los Angeles, on December 27. The membership consists of the office employees and their families. M. A. Quirk, manager of industrial relations for the company, presided. A feature of the program was the presentation of a 35-year service pin to Paul Vinton, manager of the materials division, and a 30-year service pin to Adam Bernhart, connected with the sales production and co-ordination division. Musical entertainment was furnished by Fanchon and Marco, Inc.

T. Kirk Hill, president of the Kirkhill Rubber Company, is recovering from a slight operation that threatened him with a serious illness and confined him to his home for several days.

Karl Faulhaber, head of the Faulhaber Rubber Company, 1346 E. Slauson Avenue, reports December as the best month he has had since entering business in Los Angeles three and a half years ago. Total sales ran 20 per cent above any other one month, he states.

Ed Royal is back at his desk in the offices of H. M. Royal, Inc., after having spent several weeks in the East calling on various firms which his company represents in California.

R. H. Daniels, formerly manager of tire sales in the Western Division for Goodyear, has been put in charge of manufacturers' sales for the Pacific Coast. George Dempsey, formerly assistant district manager for Goodyear in Los Angeles, has been promoted to district manager in El Paso, Texas.

Golden State Rubber Mills, Inc., 651 East 61 Street, has introduced a secondary line of bibb washers in a price range slightly below the regular line of washers manufactured by this company. A. S. Rocklen, manager, points out that twelve years ago when he first contemplated manufacturing high grade bibb and faucet washers all such washers were shipped from the East. During 1939, he states, the tables were turned to the point where between 55 and 60 million such washers were manufactured by three Los Angeles firms alone, *i.e.*, the Kirkhill Rubber Company, the Sierra Rubber Company and the Golden State Rubber Mills, Inc., and shipped to all parts of the country, even to the Atlantic seaboard in large amount.

New items put under production by the Golden State Rubber Mills, Inc., include the "Scotch" purse formerly manufactured in a small way in Detroit, Michigan. This purse, made entirely of rubber, receives the coins or currency through four small round holes in the side. Since the holes have to stretch to admit the coins the coins cannot slip out or be lost. The little purse can be carried in a lady's larger purse thus giving her a definite place for money and simplifying the business of making change. The purses are to be manufactured in five different colors—black, green, blue, orange, and brown. The purse is wrapped in cellophane with a small card of instructions. A big market has already been found for the purse and preliminary sales have been made in the premium field.

A. S. Rocklen, manager, states that the plan followed by his company is to introduce a new item every sixty days, the business value of this idea lying in the careful selection of new and appealing items. For example, a rubber telephone base introduced about three years or more ago, giving a practical non-skid feature to a desk telephone, is still popular and more than two and a half millions of these have been sold to date. A handy memo pad holder introduced recently is selling in large numbers. The features that make this popular are its non-skid bottom and patent clasp which holds the memo pad in place.

P. W. Beggs, who has been plant superintendent for Goodyear for some years, was scheduled to leave early in January for Sao Paulo, Brazil, where he would assume charge of the new plant being installed by Goodyear. Accompanying Mr. Beggs were to be G. E. McGehee, R. S. Lord, and A. L. Michael, all of whom will serve in supervisory capacities under him.

P. W. Litchfield, president of the Goodyear Tire and Rubber Company, accompanied by H. E. Blythe, vice-president and manager of the tire department at Akron, spent part of the month of December in Los Angeles and neighboring points.

E. H. Lewis, manager of the Western Insulated Wire Company, a factory installed only a few years ago at 1001 East 62nd Street, reports a development in sales that is most encouraging.

Fifty key men from the U. S. Rubber Company staged a farewell dinner at the Annandale Country Club in Pasadena, on January 10, for Fred S. Carpenter, factory manager of the plant in Los Angeles, who was scheduled to leave Los Angeles for Buenos Aires, Argentina, on January 12. In the Argentina capital, Mr. Carpenter is slated for the job of laying out the new plant proposed by his company and will supervise its erection. Mr. Carpenter was slated to spend some time in Akron before going on to Argentina. It is assumed he will be absent from Los Angeles for eight or nine months.

The addition to warehouse facilities at the U. S. Rubber Company plant is complete adding some 55,000 square feet of storage space for finished products. The new addition is of reinforced brick construction, the dimensions being 210 by 260 feet, and the cost approximately $82,000.

The next meeting of the Los Angeles Rubber Group will be held in the Rainbow Room at the Mayfair Hotel on Tuesday evening, February 6. Bill Holmes, newly elected chairman, states that an interesting program is in the making.

Absorbs Bondall Company

The Inland Manufacturing Division of the General Motors Corporation, Dayton, Ohio, with a branch factory at Clark, N. J., recently absorbed the Bondall Company of St. Louis, Mo. Machinery and other assets of Bondall have already been transferred to the Dayton plant of Inland Manufacturing. Bondall had been engaged in the manufacture of frictional materials, such as those required in the making of automobile clutch facings, automobile brake bands, and other similar applications where mechanical friction is an important factor. The acquisition of the company will broaden the line of products made by Inland Manufacturing, according to Wallace S. Whittaker, general manager.

To Market Latex Crepe

Charles F. Connor & Co., Inc., 110 State Street, Boston, Mass., has been organized to sell crude rubber to manufacturers in the New England area. The new company, which will act as a merchant and sell from stock, is headed by Charles F. Connor as president. It will specialize in the marketing of latex crepe rubber and has concluded arrangements with reputable shippers in the Middle East whose marks have been found suitable for individual requirements. Although the troubled conditions abroad have seriously affected both shipping space and schedules, the new company is finding no difficulty in importing various grades of latex crepe, according to Mr. Connor.

Drops Spanish Subsidiary

The Compania Espanalo de Neumaticos y Gaucho Goodyear, Spanish subsidiary of the Goodyear Tire & Rubber Co., Akron, was dissolved and liquidated at a stockholders' meeting held by the parent company on December 27. The subsidiary was purely a sales organization and had been virtually inactive since the start of the Spanish revolution. Goodyear has no manufacturing unit in Spain.

Obtains New Patents

The United States Rubber Company, in association with Alfred Vamos, has obtained three U. S. patents covering elasticized shoes and fabrics. These patents, which have been termed basic, are: No. 2,184,261, covering shoes made with elasticized leather in the instep, designed to afford improved fit and increased comfort; No. 2,184,082, covering a shoe made from elasticized material and so constructed as to prevent the creasing or wrinkling across the fore part of a shoe; and No 2,059,747, covering elasticized shoes made with pleated leather or fabric. In addition to these patents, the company has two applications pending which also cover elasticized leather and shoes.

Set Up Control Panel

A voluntary control panel for the rubber industry to cooperate with the government to facilitate the purchasing and handling of rubber products categoried as war materials has been organized in England. Members of the panel include Sir Walrond Sinclair, Sir George Beharrell, and Sir Thomas Purves. Contact with the various government departments will be made through Sir Walrond Sinclair. Advisory committees have been set up by several trade associations to cooperate with the members of the panel, including the Cable Makers, Tyre Manufacturers, Rubber Proofers, Rubber Footwear, Moulded Hose and English Rubber Thread associations.

Flame-Hardening Process

A higher degree of hardness in steel and alloy iron rolls, mandrels, etc., is said to be obtained by a new flame-hardening process developed by the Linde Air Products Company, which is now in operation at the plant of Farrel-Birmingham Co., Inc., Ansonia, Conn. By use of the new process, known as the vertical combination method, Farrel-Birmingham is able to raise the hardness of a 65 to 70 carbon steel cylindrical object to approximately 90 or better on the Type "C" Scleroscope. The new method is said to have proven advantageous in many applications, including the manufacture of rubber engraving rolls.

Popular Exhibit Space

An independent survey recently concluded by Market Analysts, Inc., has shown that the transportation area at the New York World's Fair was the most popular exhibit space in the grounds. The same survey showed that the typical Fair visitor was far above the average man-in-the-street financially, in education, and in leisure. Commenting on the rubber exhibits, the report stated: "One of the tire companies figured that it cost them 8 cents to get one-half hour of the average visitor's undivided attention." This, according to the report, compares favorably with other advertising media.

Miniature Rubber Gloves

Miniature rubber gloves, approximately the size to fit large dolls, which are proving popular as a novel souvenir, were recently introduced by the Oak Rubber Co., Ravenna, Ohio. These lilliputian gloves, in bright colors, including red, yellow and green, are packed 72 pairs to the box and sell for two cents per pair. A colorful display card, as seen in the accompanying illustration, is furnished with each box, making for an attractive counter display.

Longest Conveyor Belt

Contract for the manufacture of the longest belt-conveyor system ever installed, for use in connection with building the Shasta Dam, was recently awarded to the Goodyear Tire & Rubber Co., Akron, by the Columbia Construction Co., Inc. The belt, twice as long as the largest previously built, will be used to haul sand and gravel 9.6 miles from Redding to Coram, California, site of the dam.

The job calls for approximately 20 miles of 36-inch wide, six-ply, long staple cotton, rubber-covered belting, weighing approximately 1,500,000 pounds. It will be installed in 26 endless, vulcanized-on-the-job units. Roughly following the contour of the rolling desert intervening between Redding and Coram, the belt-conveyor will begin its haul at an elevation of 490 feet, carry through a pass at a maximum altitude of 1450 feet, and make delivery to its extreme northern terminal at an elevation of 650 feet.

To be erected on wooden bents, varying in height above the ground from 4 to 90 feet, the conveyor system will require the use of 12,500 steel troughing idlers. The 26 terminals at which links of the system overlap will be of combination steel and wood construction. Each of the 26 links will be motivated with 200 h.p. electric motors, except three units which are down-grade or lowering conveyors. Capacity of the system will be 1100 tons per hour while conveying at a speed of 550 feet per minute.

Copies of the 1939 RUBBER RED BOOK are still available. Direct orders to THE RUBBER AGE.

Chicago Meets February 9

The next meeting of the Chicago Group, Rubber Division, A.C.S., will be held at the Hotel Sherman in Chicago on February 9. As usual, dinner will be held in the College Inn of the hotel before the technical session. Dr. A. M. Neal, Acting Head, Rubber Laboratory, E. I. du Pont de Nemours & Co., Wilmington, Delaware, will deliver a paper on "The Aims of Present Day Accelerator Research." Reservations for the meeting should be made with B. W. Lewis, c/o Wishnick-Tumpeer, Inc., 435 N. Michigan Ave., Chicago, secretary of the group.

Question Tire Ads

The Federal Trade Commission served complaints on Firestone, Goodrich and Goodyear on January 5 alleging misleading representations in advertising savings in connection with sales of their respective products. The complaints allege that all three companies advertised savings from 25 to 50% during certain pre-holiday sales last year, but that the actual reductions from usual prices ranged from nothing to 16.8% in the case of Firestone, from 11.15 to 16.8% in the case of Goodyear, and from 14.38 to 16.64% in that of Goodrich.

Wins Tire Design Suit

Master Tire & Rubber Corp., Findlay, Ohio, was restrained from manufacturing, and the Toledo Tire, Globe Tire and World Tire corporations were restrained from selling, automobile tires similar to the B. F. Goodrich Company's "Safety Silvertown" model under a consent decree signed by Federal Judge Robert N. Wilkin at Cleveland on December 28. Goodrich, in its suit, claimed the defendants were selling a "Keystone" tire with tread and sidewall design similar to that of its own product.

Division Meeting Dates

The next meeting of the Rubber Division, A.C.S., which will be held in Cincinnati, Ohio, in conjunction with the general convention of the Society, will be held at the Hotel Gibson on Thursday and Friday, April 11 and 12. The general convention of the society gets under way on Monday, April 8. Members of the Rubber Division planning to attend the meeting are urged to make reservations at the Hotel Gibson as soon as possible.

Playtex Mitts

Department stores in the New York area are displaying Playtex Mitts, a product of the International Latex Corp., Dover, Delaware. These mitts, in one size only to fit men or women, are made of latex and are recommended for wear during washing of all kinds, from dishes to cars. A tight wrist band keeps out suds or dirt. They are available in red, green, pale or navy blue, white and yellow.

USING PLIOFILM BAGS FOR PACKING OF FOOD

A process for the packing of fruits, vegetables and fish in Pliofilm bags instead of tin cans has been developed and is now being used by packing plants in California and Mexico for local distribution. Development of the process is credited to Dr. Duryea Bensel, president, Bensel Brice Corp., Hollywood, California. Negotiations for leasing the process on a royalty basis are now being conducted so that operations on a national scale may be expected before long.

In the new method, fruits, vegetables, fish and meats are packed in Pliofilm bags just as they are in cans, and the bags cooked in the regular canning equipment. According to company officials, the use of bags instead of cans results in saving of $8 a thousand, or roughly 50 per cent, in the cost of containers.

Claims also are made that the lighter packages will result in a 25 per cent saving in freight costs, but this is qualified by a statement that a new classification, differing from freight charges for canned goods, may be established by the railroads.

Can manufacturers so far have declined official comment on the new process, but said they had been watching the experiments for the last year. They were skeptical of claims that the method would displace tin cans, pointing out that 11,394,324,000 cans are used annually in this country for the preservation of foods. Almost 60 per cent of the annual tinplate output of the country is used by food canners, they explained.

Among merchandising advantages claimed for the new method of packing is that the goods will offer strong competition to frozen foods. The type of packages now being used have a "window" in the package through which consumers can see the foods. An outside cardboard box covers the Pliofilm bag in which the foods are cooked and a small window in the center of the box affords visual display of its contents.

Introduce Monten Wax

Monten Wax, a substitute for Montan Wax, has been introduced by the Beacon Co., 89 Bickford St., Boston, Mass. According to the manufacturers, companies engaged in the manufacture of rubber and other products are finding that the new substitute merits consideration on a permanent basis. Unlimited quantities of the new wax are said to be available.

Form Toyad Corporation

Under the name of the Toyad Corporation, a new organization has been formed at Latrobe, Penna., to manufacture displays, toys and novelties of latex and latex sponge. W. M. Gardner is president of the new firm, J. R. Rogers is secretary-treaturer, Lyle A. Clough is chief chemist, and G. R. Hecht is general manager.

Barter Rubber Arrives

The first shipment of rubber to the United States under the rubber-cotton exchange agreement between this country and Great Britain recently arrived at Boston. The shipment totalled approximately 40 tons and came from Singapore. The bulk of the 87,500 tons involved in the agreement will be delivered during the first three months of the current year. According to the terms of the barter arrangement, the last shipment of rubber must leave the Orient before April 1, unless war conditions make the traffic impossible. The rubber will be stored at Boston, Baltimore, New Orleans and New York.

New Monsanto Accelerator

"Thiurad," a new tetramethyl thiuram disulfide accelerator, has been introduced by the Rubber Service Department of the Monsanto Chemical Company, Akron, Ohio. The new material sells for $2.35 per pound, any quantity, f.o.b., Nitro, West Virginia. The company assures prompt shipments on all orders.

A.M.A. Moves Headquarters

Effective January 2, headquarters for the Automobile Manufacturers Association will be maintained in the New Center Building, Detroit, Mich., instead of in New York City as heretofore. The move was made in the belief that placing the main office of the Association more nearly at the geographical center of the industry would expedite its service to member companies. A branch office, in charge of the National Automobile Show and other matters, will be continued in New York, at the present address, 366 Madison Avenue.

Back Issues Wanted

C. W. Christensen, treasurer of the Rubber Division, A.C.S., advises that he wishes to purchase copies of the January and April, 1939, issues of *Rubber Chemistry & Technology*. He will pay $1.00 for each copy of these issues received in good condition. Copies should be addressed to C. W. Christensen, Monsanto Chemical Co., 1012 Second National Building, Akron, Ohio.

Obituaries

Benedict Reis

Benedict Reis, associated with rubber manufacturing enterprises since before the turn of the century, and president of the New York Mackintosh Clothing Co., Inc., the Mamaroneck, N. Y., plant of which was sold at public auction recently to liquidate its debts, died on December 25 in the Hotel McAlpin, New York, of a heart attack suffered while walking past the hotel. He was 70 years of age.

Mr. Reis, who was born in Brest-Litovsk, Poland, went to France in his youth and for several years was associated with rubber manufacturers in that country. In 1892 he came to the United States where he continued his work in the rubber field, being employed by the old C. Kenyon Company in Brooklyn, N. Y., and later with Rosenwald & Weil of Chicago. In 1894 he founded the New York Mackintosh Clothing Co.

Mr. Reis was descended from a family of rabbis that dated back to the sixteenth century. He was active in both Jewish and non-sectarian philanthropic and charity work, and was president of the Raincoat Manufacturers Division of the American Red Cross. He was also one of the founders of the Sons of Zion in Paris. He is survived by two sons and two daughters.

George Mott Adams

George Mott Adams, vice-president of the Anchor Packing Co., manufacturers of mechanical rubber goods in Philadelphia, Penna., died at his home in Melrose Park, near Philadelphia, on December 12, at the age of forty-four. Son of the late Lyndon E. Adams, founder of the company, Mr. Adams was born at Oak Ridge, Penna., and was educated at the Chestnut Hill Academy and the University of Pennsylvania. He served with the Pennsylvania National Guard in France during the World War. He leaves a widow and daughter.

Francis S. Schimerka

Francis S. Schimerka, who aided the late Thomas A. Edison in his experiments with crude and synthetic rubber, died in his home in East Orange, N. J., at the age of 66, on December 18, after a brief illness. He had been associated with the firm of Thomas A. Edison, Inc., as a chemist since 1921. Born in Vienna, Mr. Schimerka was graduated from the Polytechnicum in that city with a chemical engineering degree in 1895. Before joining Edison he worked for various mining companies. For the last two years he was assisting in the compilation of historical data on all of Mr. Edison's chemical experiments.

William L. Wear

William L. Wear, assistant sales manager, sundries division, B. F. Goodrich Co., Akron, died as a result of what was termed "accidental suicide" in his home on December 23. He was 56 years of age. Tying a towel around his neck and fastening it to the doorknob in the kitchen of his home, in an apparent attempt to play a practical joke, Mr. Wear was found dead by strangulation. Funeral services were held at the Sweeny Memorial Chapel in Akron on December 27, followed by cremation. He leaves a widow.

MARKETS

RUBBER—COTTON AND FABRICS—CHEMICALS

NEW YORK, JANUARY 9, 1940

Crude Rubber

AFTER reaching 20.80 on December 14, high for the period, based largely on the publication of favorable consumption statistics for November, the price for spot rubber on the Commodity Exchange started a downward movement, touching 20.50 on December 19. Commission house selling was the major factor in the declining trend during this period. Renewed factory interest brought the price back to higher channels, 20.80 being reached again on December 26, but again a declining trend, once more due to commission house selling, this time combined with factory selling, set in. With the announcement that net exports of crude rubber during November from producing countries signatory to the restriction scheme dropped approximately 33,000 from those in the preceding month, the price on January 2 dropped sharply to 19.00, low for the period. Prices firmed shortly thereafter, however, reaching 19.68 today (January 9). Quotations in the outside market, Exchange, London and Singapore, follow:

As of January 9

Plantations—

Ribbed Smoked Sheets—

No. 1 Spot	—	@	.19 1/4
April-June	—	@	.19 1/4
No. 2	—	@	.19 3/8
No. 3	—	@	.19 1/2
No. 4	—	@	.19 7/8
Thin Latex Crepe	—	@	.20 3/4
Thick Latex Crepe	—	@	.20 3/8
Brown Crepe, No. 1	—	@	.19 7/8
Brown Crepe, No. 2	—	@	.19
Amber Crepe, No. 2	—	@	.19 1/8
Amber Crepe, No. 3	—	@	.19
Brown Crepe, Rolled	—	@	.17

Latex—

Normal, per lb., carload lots.	—	@	.24 1/2

Paras—

Up-River, fine	—	@	.18 3/4
Acre Bolivian, fine	—	@	.19

Balata

Surinam sheet	—	@	.44

LONDON MARKET

Standard Smoked Sheets—Sellers—January 9

April-June	—	@	11 7/16d
October-December	—	@	11 5/16d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—January 9

April-June	—	@	10 5/16d
July-September	—	@	10 1/16d

Reclaimed Rubber

Despite a slight drop in the demand for reclaim, the trade is quite optimistic for the first quarter of the present year. Renewed demand is expected shortly based on a general trend in business improvement. There has been no change in the price structure since our last report. Current quotations follow:

Shoe

Unwashed	lb.	.06 1/2	@	.06 3/4
Washed	lb.	.10	@	.10 1/4

Tube

No. 2 (Compounded)	lb.	.09	@	.10
Red Tube	lb.	.09	@	.09 1/4

Tires

Black (acid process)	lb.	.07	@	.07 1/4
Black, selected tires	lb.	.06	@	.06 1/4
Dark Gray	lb.	.09 1/4	@	.10
White	lb.	.12 1/2	@	.14
Truck, Heavy Gravity	lb.	.05 1/2	@	.06
Truck, Light Gravity	lb.	.07	@	.07 1/2

Miscellaneous

Mechanical blends	lb.	.04 1/2	@	.05

Scrap Rubber

(Delivered Akron Mills)

Dealers report continued steady demand. Stocks are said to be fairly plentiful. Prices have increased on clean solid truck and boot and shoe stocks, and dropped on auto tire peelings, since our last report. Current quotations follow:

(Prices to Consumers)

Auto tire peelings	ton	23.00	@	24.00
Mixed auto	ton	13.50	@	15.00
Beadless tires	ton	17.00	@	18.00
Clean solid truck tires	ton	30.00	@	31.00
Boots and shoes	ton	21.00	@	22.00
Arctics, untrimmed	ton	15.00	@	16.00
Inner tubes, No. 1	lb.	.10	@	.11
Inner tubes, No. 2	lb.	.04 5/8	@	.04 3/4
Inner tubes, Red	lb.	.04 1/2	@	.04 3/4

Cotton

Although moving in a comparatively narrow range—60 points—since our last report, cotton prices have been very irregular. As an indication, a price of 11.66 for middling uplands, high for the period, was quoted on December 13; this dropped to 11.13 the following day, then umped to 11.13 on December 15, and went down to 11.06, low for the period, a few days later, on December 20. Extremely favorable figures for November was responsible for the high mark, while hedge and foreign selling, straddling, and diminished support from abroad contributed to the declines. Firming of the price, from time to time, was attributed to spontaneous trade demand, surges of foreign speculation, buying of futures by spot interests, and mill price fixing. Much debate has been heard in the trade in regard to loan repossessions and equities sold. It is practically impossible to determine the actual amount which has been disposed of by original holders. This tends to unsettle the market. Quotations for middling uplands on the Exchange follow:

	Dec. 12*	January 9*		
	Close	High	Low	Close
March	10.85	11.30	11.23	11.29
July	10.29	10.92	10.65	10.65
October	....	10.06	9.94	9.97

* New Contract.

Tire Fabrics

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.33	@	.33 1/4
Peeler, carded, 23/4/3	lb.	.34	@	.34 1/4
Peeler, carded, 15/3/3	lb.	.31	@	.31 1/4
Peeler, carded, 15/4/2	lb.	.31	@	.31 1/4
Peeler, carded, 13/3/3	lb.	.30	@	.30 1/4

CHAFERS

Carded, American, 1 1/16"	lb.	.33	@	.33 1/2
Carded, American, 1"	lb.	.24 1/2	@	.31 1/2

Sheetings

48x40	36 in.	5.50	lb.	—	@ .04 1/2
40x40	36 in.	6.15	lb.	—	@ .04 1/4
40x36	36 in.	6.50	lb.	—	@ .04 1/8
48x48	40 in.	2.50	lb.	—	@ .09 1/4
48x48	40 in.	2.85	lb.	—	@ .08 1/4
56x60	40 in.	3.60	lb.	—	@ .07 3/8
48x44	40 in.	3.75	lb.	—	@ .06 1/2

Ducks

Enameling (single filling)	lb.	.28	@	.29
Belting and Hose	lb.	.30	@	—
Single filling, A grade	lb.	.11 1/2	@	.12 1/2
Double filling	lb.	.12 1/2	@	.13 1/8

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 Tons

FROM DECEMBER 13 TO JANUARY 9

Date		Spot	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Sales
Dec.	13	20.67	20.55	19.80	19.66	19.53	19.32	19.10	18.92	18.75	18.68	18.62	18.62	18.62	——	362
	14	20.80	20.60	19.80	19.70	19.60	19.36	19.11	18.95	18.80	18.72	18.65	18.65	18.65	——	341
	15	20.50	20.25	19.60	19.48	19.35	19.15	18.95	18.84	18.72	18.65	18.57	18.57	18.57	——	75
	16	20.55	20.30	19.60	19.50	19.40	19.24	19.08	18.96	18.85	18.77	18.70	18.70	18.70	——	31
	17	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	18	20.61	20.45	19.75	19.65	19.55	19.32	19.10	19.05	19.00	18.89	18.78	18.73	18.73	——	100
	19	20.50	20.35	19.67	19.57	19.47	19.30	19.12	19.04	18.95	18.83	18.70	18.75	18.75	——	125
	20	20.55	20.24	19.35	19.24	19.13	19.02	18.90	18.81	18.73	18.61	18.50	18.50	18.50	——	115
	21	20.55	20.30	19.20	19.07	18.95	18.84	18.72	18.61	18.50	18.42	18.35	18.35	18.35	——	112
	22	20.75	20.64	19.35	19.22	19.10	18.97	18.85	18.75	18.65	18.54	18.43	18.43	18.43	——	75
	23	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	24	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	25	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	26	20.80	20.80	19.60	19.41	19.13	18.99	18.85	18.70	18.55	18.47	18.40	18.40	18.40	——	73
	27	19.50	——	19.10	19.10	19.02	18.87	18.70	18.63	18.51	18.45	18.28	18.33	18.33	——	200
	28	19.15	——	19.00	19.00	19.08	18.90	18.73	18.61	18.52	18.48	18.43	18.43	18.43	——	177
	29	19.07	——	18.95	18.95	18.94	18.85	18.75	18.62	18.50	18.46	18.43	18.43	18.43	——	114
	30	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	31	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
Jan.	1	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	2	19.00	——	18.92	18.90	19.00	18.89	18.77	18.64	18.50	18.44	18.38	18.38	18.38	18.38	57
	3	19.05	——	18.93	18.90	19.00	18.89	18.78	18.69	18.59	18.54	18.50	18.45	18.45	18.45	56
	4	19.10	——	19.01	19.00	18.99	18.86	18.74	18.65	18.57	18.48	18.40	18.35	18.35	18.35	47
	5	19.10	——	18.91	18.91	19.00	18.87	18.75	18.61	18.48	18.37	18.26	18.21	18.21	18.21	96
	6	19.12	——	18.91	18.91	19.00	18.86	18.72	18.58	18.43	18.32	18.20	18.20	18.20	18.20	26
	7	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	8	19.43	——	19.32	19.32	19.30	19.15	19.00	18.84	18.68	18.56	18.45	18.40	18.35	18.30	107
	9	19.68	——	19.52	19.50	19.50	19.37	19.22	19.02	18.83	18.72	18.62	18.54	18.47	18.40	200

New York
January 11, 1940

Rubber CHEMICAL Markets

All Quotations F.O.B. Works Unless Noted

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.24 @	.30
A-10	lb.	.31 @	.35
A-11	lb.	.52 @	.65
A-19	lb.	.52 @	.65
A-32	lb.	.70 @	.80
A-77	lb.	.42 @	.55
A-100	lb.	.42 @	.55
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	.55 @	.65
Butyl Zimate	lb.	2.50 @	—
Captax	lb.	.50 @	.57
Crylene	lb.	.55 @	.65
Di-Ortho-Tolyguanidine	lb.	.44 @	.46
Diphenylguanidine	lb.	.35 @	.36
El-Sixty	lb.	.50 @	.65
Ethyl Zimate	lb.	2.50 @	—
Ethylidene aniline	lb.	.42 @	.43
Formaldehyde aniline	lb.	.37½ @	.42
Guantal	lb.	.40 @	.50
Hepteen	lb.	.35 @	.40
Hexamethylenetetramine	lb.	.33 @	—
Lead Oleate, No. 999	lb.	.14 @	—
Witco		.15 @	—
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.36 @	.37
Monex	lb.	— @	2.35
Oxynone	lb.	.64 @	.80
Phenex	lb.	.50 @	.55
Pip-Pip	lb.	2.50 @	—
Pipsolene	lb.	1.55 @	1.85
R & H 40	lb.	.40 @	.41
R & H 50-D	lb.	.42 @	.43
R-2	lb.	1.40 @	1.80
R-2 Crystals	lb.	2.50 @	2.75
R-23	lb.	.40 @	—
RN-2	lb.	1.40 @	1.80
RN-2 Crystals	lb.	2.00 @	2.25
Rotax	lb.	.60 @	.65
Safex	lb.	1.20 @	1.30
SPDX	lb.	.70 @	.75
Super-Sulphur No. 1	lb.	.50 @	—
No. 2	lb.	.18 @	.25
Thiocarbanilid, drums	lb.	.24 @	.30
Thiurad	lb.	— @	2.35
Trimene	lb.	.55 @	.65
base	lb.	1.05 @	1.20
Triphenylguanidine	lb.	.45 @	—
Tuads	lb.	2.35 @	—
Ulto	lb.	1.50 @	1.75
Ureka	lb.	.60 @	.75
Ureka Blend B	lb.	.60 @	.75
Ureka C	lb.	.56 @	.65
Vulcanex	lb.	.42 @	.43
Vulcanol	lb.	.85 @	—
Zimate	lb.	2.35 @	—
Inorganic			
Litharge, domestic	lb.	.07 @	.07½
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blacks (See Compounding Materials)

Blues			
Prussian	lb.	.36 @	.37
Ultramarine	lb.	.15 @	—
Browns			
Mapico	lb.	.13 @	—
Umber, Turkey	lb	.04 @	.04½
Greens			
Chrome	lb.	.21 @	—
Chromium Oxide, bbl.	lb.	.21 @	—
Guignet's Green	lb.	.?0 @	—
Reds			
Antimony crimson, 15/17	lb.	.45 @	—
sulfur, free	lb.	.48 @	.60
Indian English	lb.	.09 @	.10
Domestic (Maroon)	lb.	.11 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red, f.o.b. Easton	lb.	.09¼ @	—
Whites			
Cryptone, No. 19	lb.	.05¼ @	.05½
Cryptone CB, No. 21	lb.	.05¼ @	.05½
Cryptone, ZS-230	lb.	.07½ @	.07¾
Cryptone, ZS-86	lb.	.07½ @	.07¾
Lithopone			
Albalith, black label—11	lb.	.03¾ @	.04
Azolith	lb.	.03¾ @	.04
Ray-bar	lb.	.05¼ @	.05¾
Ray-cal	lb.	.05¼ @	.05¾
Rayox	lb.	.13 @	.14
Titanox A	lb.	.13 @	.14
Titanox B	lb.	.05¼ @	.05¾
Titanox C	lb.	.05 @	.05½
Zinc Oxide—American Process			
American Azo: ZZZ (lead free)	lb.	.06¼ @	.06½
Anaconda, lead free	lb.	.06¾ @	.06½
Horsehead Lead Free Brand:			
Special—3	lb.	.06¼ @	.06½
XX Red—4	lb.	.06¼ @	.06½
XX Red—72	lb.	.06¼ @	.06½
XX Red—78	lb.	.06¼ @	.06½
XX Red—103	lb.	.06¼ @	.06½
Kadox, black label—15	lb.	.06½ @	.06¾
Blue label—16	lb.	.06½ @	.06¾
Red label—17	lb.	.06½ @	.06¾
St. Joe, black label	lb.	.06¼ @	.06½
green label	lb.	.06¼ @	.06½
red label	lb.	.06¼ @	.06½
U. S. P.—7. bbls	lb.	.09½ @	.09¾
Zinc Oxide—French Process			
Florence White seal—7 bbls.	lb.	.08½ @	.08¾
Green seal—8	lb.	.08 @	.08¼
Red seal—9	lb.	.07½ @	.07¾
Yellows			
Cadmolith	lb.	.55 @	.65
Chrome	lb.	.14½ @	.15½
Mapico	lb.	.09½ @	—

BLACKS

(In bags, carload lots)

Aerfloated Arrow	lb.	.02425 @	—
Certified	lb.	.02425 @	—
Certified Spheron	lb.	.02425 @	—
Continental	lb.	.02425 @	—
Disperso	lb.	.02425 @	—
Excello	lb.	.02425 @	—
Fumonex	lb.	.03 @	—
Fumonex Beads	lb.	.03 @	—
Gastex	lb.	.03 @	—
Kosmobile	lb.	.02425 @	—
Kosmobile 66	lb.	.02425 @	—
Micronex (Amarillo)	lb.	.02425 @	—
Micronex Beads (Amarillo)	lb.	.02425 @	—
Pelletex	lb.	.03 @	—
P-33	lb.	.0475 @	—
Supreme	lb.	.02425 @	—
Thermax	lb.	.02 @	—
Wyex	lb.	.02425 @	—

COMPOUNDING MATERIALS

Aluminum Flake	ton.	21.85 @	24.50
Ammonia carbonate, lump	lb.	.10½ @	.12
Asbestine	ton	13.00 @	15.00
Barium carbonate (98-100%)	ton	— @	—
Barium Dust	lb.	.05 @	.06
Barytes	ton	23.65 @	31.15
Bentonite	lb.	.02 @	.03
Blanc fixe dry f.o.b. works	ton	60.00 @	65.00
Calcene	ton	37.50 @	45.00
Catalpo (fact.)	lb.	.02 @	—
Chalk, precipitated			
Suprex white, extra lt.	ton	45.40 @	60.00
heavy	ton	45.00 @	55.00
Clay, Kaolin, domestic	ton	7.50 @	15.00
Aerfloted, Suprex	ton	9.50 @	21.00
Congaree	ton	9.50 @	—
Crown (f.o.b. plant)	ton	9.50 @	—
Dixie	ton	10.00 @	24.50
McNamee	ton	10.00 @	22.50
Par	ton	10.00 @	22.50
Witco	ton	9.50 @	—
Cotton Flock (Dark)	lb.	.10½ @	.13
Glues, extra white	lb.	.28 @	.30
medium white	lb.	.14 @	19
Kalite No. 1	ton	24.00 @	50.00
Kalite No. 3	ton	34.00 @	60.00
"Lime Crest" Industrial Filler No. 100	lb.	— @	—
Magnesium carbonate	lb.	.07½ @	—
Mica	ton	35.00 @	44.00
Pyrax A	ton	6.00 @	20.00
Rottenstone (powdered)	lb.	.02½ @	.05
Soapstone, powdered	ton	16.00 @	22.00
Starch, powdered	cwt.	2.90 @	4.10
Talc, domestic	ton	25.00 @	45.00
Whiting, commercial	ton	17.00 @	18.00
Columbia Filler	ton	9.00 @	14.00
English Cliffstone	ton	33.00 @	43.00
Witco	ton	6.00 @	—
Wood Flour	ton	20.00 @	25.00
Zinc Carbonate	lb.	— @	—
Zinc Stearate	lb.	— @	—

MINERAL RUBBER

285°-300° Mineral Rubber	ton	21.00 @	42.00
Black Diamond	ton	25.00 @	—
Genasco, solid (factory)	ton	25.00 @	27.00
Hard Hydrocarbon	ton	21.00 @	42.00
Parmr, solid	ton	21.00 @	27.00
Pioneer, MR, solid	ton		
Pioneer-granulated	ton		

MISCELLANEOUS

Aromatics—Rodo #0	lb.	3.50 @	4.00
Rodo #10	lb.	4.50 @	5.00
Curodex 19	lb.	2.75 @	—
Curodex 188	lb.	3.50 @	—
Curodex 198	lb.	4.50 @	—
Para-Dor No. 5145	lb.	2.00 @	—
Aresklene No. 375 (dispersing, wetting and penetrating agent)	lb.	.35 @	.50
Darvan (dispersing agent)	lb.	.30 @	.47
Santomerse S (dispersing, wetting, penetrating and stabilizing agent)	lb.	.11 @	.25
Sunproof	lb.	.20 @	.25
Sponge Paste	lb.	— @	.18
Tackol (tackifier)	lb.	.085 @	.18
Tonox	lb.	.52 @	.61

SOFTENERS

Acids			
Acetic, 28%, bbls.	100 lb.	2.53 @	2.78
Nitric, 36 degrees	cwt.	5.00 @	6.00
Sulfuric, 66 degrees	ton	15.50 @	16.50
Acids, Fatty			
Laurex	lb.	.11¼ @	.13¾
SL #10	lb.	.12 @	.14
Stearex Beads	lb.	.08 @	.09
Stearic, double pressed	lb.	.12½ @	.13½
Stearite	lb.	.10½ @	—
Alkalies			
Caustic Soda, 76%	cwt.	2.70 @	3.55
Soda Ash, 58%, C.L.	cwt.	— @	2.35
Oils			
Cycline Oil	gal.	.14 @	.20
Degras, bbls.	lb.	.07¾ @	.08
Fluxrite	lb.	.05½ @	.06½
Palm Niger	lb.	.05½ @	.06½
Para-Flux	gal.	.17 @	.18
Para Lube	lb.	— @	.05
Petrolatum, light	lb.	.03¼ @	.03¾
Pigmentaroil, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
Pine, steam distilled	gal.	.64 @	.69
Rosin Oil, cmpd	gal.	.40 @	—
Rubberol, f.o.b. Chicago	lb.	.13½ @	.14
Rubtack	lb.	.08 @	.10
Seedine, c.l.	lb.	.07¼ @	—
Tackol	lb.	.08½ @	.18
Witco Palm Oil	lb.	.07 @	—
Witco Softener No. 20	gal.	.20 @	—
Woburn No. 8, c.l.	lb.	.06 @	—
Wobonite, c.l.	lb.	.05 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.05½ @	.06½
coal tar	ton	19.00 @	22.00
hardwood	ton	16.00 @	22.50
pine, 200 lb. gr. wt.	bbl.	6.00 @	6.50
Pigmentar, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
R. S. L. Resin	lb.	— @	—
Retort Pine Tar, drums	ton	20.00 @	26.00
Solvents			
Acetone, pure	lb.	— @	.06¾
Alcohol, denatured, methanol, No. 1 bbls.	gal.	.33 @	.39
Benzene, 90%	gal.	.18 @	.23
Beta-Trichlorethane	gal.	— @	.20
Bondogen	lb.	.98 @	1.50
Carbon, bisulfide	lb.	.05¼ @	.08
Carbon tetrachloride	gal.	.73 @	1.065
Dichlorethylene	lb.	— @	.25
Dipentene, cml., drums	gal.	.41 @	.50
Ethylene dichloride	lb.	.05½ @	.06½
Plastogen	lb.	.07¼ @	.12
Reogen (drums)	lb.	.11½ @	.26
Rub-Sol (f.o.b. Okla.)	gal.	.09 @	—
Trichlorethylene	lb.	— @	.08½
Turpentine, spirits	gal.	.43 @	.47
dest. dist., drums	gal.	.33 @	.41
Waxes			
Beeswax, white	lb.	.39 @	.45
Carnauba, yellow	lb.	.46 @	.47½
Ceresin, white, dom.	lb.	.08 @	.11
Montan, crude	lb.	.10¾ @	.11¾
Paraffin (c.l.—f.o.b. N. Y.)			
Yellow crude scale	lb.	.02¾ @	—
White crude scale 124/126	lb.	.02¾ @	.03
Refined, 122/127	lb.	.04½ @	—

ANTI-OXIDANTS

Agerite Alba	lb.	1.50 @	1.95
Exel	lb.	1.00 @	1.40
Gel	lb.	.57 @	.73
Hipar	lb.	.65 @	.92
Powder	lb.	.52 @	.64
Resin	lb.	.52 @	.64
Resin D	lb.	.52 @	.64
White	lb.	1.25 @	1.60
Albasan	lb.	.70 @	.75
Antox	lb.	— @	.56
B-L-E	lb.	.52 @	.61
Flectol B	lb.	.52 @	.65
Flectol H	lb.	.52 @	.65
Flectol White	lb.	.90 @	1.15
Neozone	lb.	.52 @	.63
Oxynone	lb.	.64 @	.80
Retardex	lb.	.35 @	.40
Santoflex B	lb.	.52 @	.65
Santovar A	lb.	1.15 @	1.40
S.C.R.	lb.	.33 @	.35
Stabilite	lb.	.52 @	.54
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.52 @	.61

MOLD LUBRICANTS

Aresklene	lb.	.35 @	.50
Cocoa Soapstock	lb.	.06 @	.08
Dipex	lb.	.06 @	.08
Lubrex	lb.	.?? @	.36
Mold Paste	lb.	.12 @	.18
Rubberol, f.o.b. Chicago	lb.	.13½ @	.14
Rusco, f.o.b. Nitro	lb.	.12 @	.36
Sericite, f.o.b. N. Y.	ton	65.00 @	—
Soap Tree Bark, cut, sifted	lb.	.06 @	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.17 @	—
Black	lb.	.08 @	.12
White	lb.	.08½ @	.12
Brown	lb.	.08 @	.10½
Neophax	lb.	.09¾ @	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.07½ @	.15
Sulfur Chloride, yellow (drs.)	lb.	.04 @	—
Sulfur flour,			
Refined, 100% pure (bags)	cwt.	2.50 @	3.65
Commercial (bags)	cwt.	1.60 @	2.35
Telloy	lb.	1.75 @	—
Vandex	lb.	1.75 @	—

Crude Rubber
Latex and Guayule
Reclaimed Rubber
Tires and Tubes

STATISTICS OF THE INDUSTRY

Rim Production
Automobiles
Gasoline
Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1924	325,899	173,367,272	23.75	10,309	6,057,637	26.23	315,590
1925	393,370	426,167,504	48.36	14,827	19,847,753	59.76	378,543
1926	409,944	501,131,064	54.57	17,671	22,470,583	56.77	392,273
1927	424,733	338,688,492	35.60	27,775	24,735,488	39.76	396,958
1928	432,633	242,727,423	25.05	32,159	18,128,761	25.17	400,474
1929	560,082	239,177,811	19.06	36,485	16,868,718	20.64	523,597
1930	482,083	139,133,048	12.88	30,205	9,310,205	13.76	451,878
1931	497,176	72,922,845	6.55	25,595	4,255,572	7.42	471,581
1932	409,556	31,936,459	3.48	20,930	2,015,612	4.30	388,626
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	387,280
1934	449,513	97,929,676	9.73	23,848	5,770,109	10.80	425,665
1935	453,134	115,299,448	11.36	11,389	3,084,331	12.09	441,745
1936	467,064	152,072,496	14.54	12,581	4,488,223	15.93	454,483
1937	574,600	237,307,041	18.44	7,902	3,385,433	19.02	566,698
1938	397,620	125,357,730	14.07	5,652	1,799,124	14.21	391,968
1938:							
Oct.	33,449	10,945,896	14.61	621	196,523	14.14	32,828
Nov.	31,903	10,572,345	14.79	415	146,276	15.73	31,488
Dec.	36,031	12,601,926	15.61	424	141,364	14.87	35,607
1939							
Jan.	35,255	12,313,006	15.59	468	165,663	15.79	34,787
Feb.	29,109	10,269,224	15.75	460	152,113	14.76	28,649
Mar.	43,490	15,058,279	15.46	439	171,279	17.43	43,051
Apr.	30,836	10,400,125	15.06	440	151,644	15.38	30,396
May	42,998	15,041,433	15.62	496	180,091	16.20	42,502
June	32,437	11,403,150	15.69	413	147,910	16.00	32,024
July	34,288	12,071,105	15.72	440	164,428	16.69	33,848
Aug.	35,794	12,702,958	15.84	267	89,741	15.01	35,527
Sept.	35,006	12,667,740	16.16	1,472	659,055	19.98	33,534
Oct.	42,784	15,211,621	15.87	5,886	2,881,172	21.85	36,898

* Revised.

Note: "Gross Imports" do not include latex or guayule. To secure more accurate figures for "Net Imports" latex and guayule figures (shown below) should be added and the re-export figure deducted from the total. Annual figures for 1922, however, include both latex and guayule; guayule only is included in 1923. Annual figures for 1922-36 were revised in February, 1937.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule: Tons	Guayule: Dollars	Balata: Tons	Balata: Dollars	Jelutong: Tons	Jelutong: Dollars	Liquid Latex (1): Tons	Liquid Latex (1): Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,272	3,537,510
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,394	4,686,743
1927	5,018	2,674,957	582	477,246	7,785	2,448,657	1,495	1,170,650
1928	3,077	1,755,685	731	430,855	7,552	2,540,059	4,007	2,121,786
1929	1,275	545,175	728	566,964	8,204	2,458,126	3,729	1,788,391
1930	1,096	347,388	502	422,684	5,907	1,403,244	4,458	1,508,786
1931	....	.....	1,207	411,380	5,777	1,019,010	4,675	888,909
1932	....	.....	707	147,403	4,607	616,596	5,112	601,999
1933	....	.....	1,659	2,261,869	5,990	944,895	11,085	1,833,671
1934	398	75,349	1,054	438,209	4,997	943,752	13,107	3,643,221
1935	459	86,835	615	188,384	5,644	1,063,126	13,553	3,782,222
1936	1,229	286,552	535	199,368	6,163	1,296,364	19,852	6,659,899
1937	2,694	745,873	354	151,344	7,109	2,017,786	23,185	10,213,670
1938	2,485	623,819	509	181,140	9,132	2,944,504	11,878	4,147,318
1938:								
Oct.	126	27,692	45	20,641	614	163,635	876	347,348
Nov.	59	12,923	66	24,725	307	76,452	1,020	394,082
Dec.	181	39,869	13	6,263	917	237,653	1,263	479,966
1939:								
Jan.	226	49,580	61	20,417	843	203,753	1,602	599,927
Feb.	212	46,576	15	4,426	510	129,726	1,717	657,565
Mar.	229	39,520	14	5,215	641	136,112	2,005	731,302
Apr.	180	24,584	59	18,170	281	72,024	1,018	360,739
May	102	22,347	56	16,359	645	161,745	2,786	1,067,682
June	91	19,879	119	33,876	597	122,087	1,836	694,863
July	150	32,626	39	18,813	663	141,540	2,934	1,064,927
Aug.	178	38,687	28	8,689	742	208,156	2,614	1,001,013
Sept.	133	30,091	36	19,682	479	100,285	2,525	965,615
Oct.	282	61,376	107	43,267	465	127,084	2,555	968,207

(1) Weight given in pounds of dry rubber contained in latex.

Note: Annual figures for 1924-1936 revised on basis of information received on February 8, 1937.

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)

	Figures on Monthly Basis: 1932*	1933*	1934*	1935*	1936*	1937*	1938*	1939
Jan.	29,648	22,645	39,190	46,636	48,631	50,879	31,265	46,234
Feb.	31,821	21,392	40,515	42,720	36,841	51,950	25,357	42,365
Mar.	29,505	17,843	47,003	42,153	42,813	54,129	32,389	50,165
Apr.	27,518	25,928	44,853	44,247	52,031	51,859	29,730	44,166
May	30,957	44,074	42,918	41,101	50,612	51,795	30,753	44,377
June	41,475	50,743	40,147	36,156	52,772	51,860	32,540	47,259
July	29,976	49,614	32,553	35,917	48,250	43,703	34,219	43,880
Aug.	23,721	44,428	33,216	38,775	46,777	41,506	40,552	50,481
Sept.	23,847	35,281	30,258	37,086	46,449	43,945	40,183	50,150
Oct.	22,286	31,543	31,253	41,969	49,637	38,754	42,850	55,764
Nov.	23,231	28,831	34,748	42,310	50,433	34,025	49,050	54,322
Dec.	18,015	28,757	36,569	42,474	49,754	29,195	48,143	
Tot.	332,000	401,079	453,223	491,544	575,000	543,600	437,031	

* Revised.

Note: All figures are now based on Department of Commerce survey figures.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption: Tons	Consumption: % to Crude	Stocks*	Year	Production	Consumption: Tons	Consumption: % to Crude	Stocks*
1929	218,954	226,588	48.4	27,464	1934	110,010	100,597	22.2	23,079
1930	157,967	153,497	40.8	22,000	1935	122,948	113,078	23.0	25,069
1931	133,351	124,126	33.9	19,257	1936	150,571	141,486	24.6	19,000
1932	75,608	77,504	23.4	16,354	1937*	185,033	162,000	29.8	28,800
1933	99,560	81,602	19.9	20,746	1938*	122,403	120,800	27.6	23,000

	Figures on Monthly Basis: Production	Consumption: Tons	Consumption: % to Crude	Stocks*		Production	Consumption: Tons	Consumption: % to Crude	Stocks*
1938:*									
Jan.	8,303	7,463	23.9	28,982	July	7,668	8,777	25.6	18,956
Feb.	6,685	7,679	30.3	27,518	Aug.	11,295	11,387	28.1	18,307
Mar.	7,416	9,109	28.1	25,366	Sept.	12,961	11,969	29.8	18,540
Apr.	6,902	8,043	27.1	23,799	Oct.	14,624	12,522	29.2	19,910
May	7,406	8,613	28.0	22,042	Nov.	15,095	13,440	27.4	21,001
June	8,180	8,779	27.0	20,785	Dec.	15,868	13,019	27.1	23,000
1939:									
Jan.	13,763	13,000	28.1	21,960	July	12,588	13,542	30.9	21,339
Feb.	13,093	12,626	29.8	21,390	Aug.	17,214	16,846	33.4	20,645
Mar.	14,528	15,322	30.5	19,955	Sept.	17,990	16,953	33.8	21,185
Apr.	14,527	13,391	30.3	22,628	Oct.	20,896	18,955	34.0	21,829
May	14,769	13,517	30.5	22,771	Nov.	20,755	18,006	33.2	22,362
June	15,871	14,870	31.4	23,058	Dec.	.....	.....	...	.....

* Stocks on hand at the end of month or year.

* Revised.

Note: Figures for 1938 were revised on June 1, 1939, and are now based on Department of Commerce survey figures.

U. S. Consumption of Gasoline

(Bureau of Mines Statistics)
(In Thousands of Barrels of 42 Gallons)

	1937*	1938*	1939		1937*	1938*	1939
January	33,668	35,323	37,487	August	49,598	50,549	53,728
February	32,034	31,981	34,595	September	47,515	46,150	49,347
March	40,524	41,409	42,520	October	45,446	46,365	49,687
April	43,461	43,430	43,977	November	42,718	45,084	47,275
May	45,407	44,937	49,547	December	39,465	41,742	.....
June	48,447	48,383	49,812				
July	51,069	47,650	50,508	Total	519,352	523,003	.....

* Revised.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1927	19,700,003	1931	11,253,800	1935	18,664,356
1928	24,247,282	1932	6,261,336	1936	20,790,192
1929	24,141,502	1933	8,713,962	1937	22,257,964
1930	17,364,096	1934	12,255,118	1938	10,612,138

1939		1939		1939	
January ...	1,714,137	May	1,243,519	September .	1,585,300
February ..	1,442,535	June	1,019,626	October ...	1,882,190
March	1,730,211	July	681,434	November .	1,783,257
April	1,348,335	August	970,571	December .	.....

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1937																																
Oct.	17¾	17¾	14⅞	17⅝	17⅝	17	16¾	16¾	16⅞	16⅝	16⅛	15⅝	16⅛	16⅝	16⅝	16⅝	—/—	15¾	15⅝	14⅝	15⅞	15⅝	15⅝	—/—	15⅝	15⅝	14¾	15⅝	15⅜	15⅛	—/—	16⅛
Nov.	15⅞	15⅝	13½	15½	—/—	15⅞	15¾	15¾	15⅞	15½	15⅝	—/—	15⅞	15⅞	15	—/—	14⅞	15⅞	14⅞	15	15⅞	15⅞	15	15¾	—/—	14⅛	15	14⅛	14½	15⅛	14⅞	14⅝
Dec.	15⅝	15⅝	13½	15½	—/—	15⅞	15¾	15¾	15⅞	15½	15⅝	—/—	15⅞	15⅞	15	—/—	14⅞	15⅞	14⅞	15	15⅞	15⅞	15	15¾	—/—	14⅛	15	14⅛	14½	15⅛	14⅞	14⅝
1938																																
Jan.	—/—	—/—	14⅞	14⅞	14⅝	14⅝	14⅝	14⅜	—/—	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	—/—	—/—	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	—/—	—/—	14⅜
Feb.	14⅞	14⅞	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14½	14½	14⅝	—/—	—/—	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	—/—	—/—	14⅛
Mar.	14⅞	14⅞	14⅜	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅝	—/—	—/—	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	—/—	—/—	14⅛
April	10⅞	11⅛	11⅛	11⅛	11⅛	11⅛	11⅛	11⅛	11⅛	11⅛	11⅛	12⅛	12⅛	12⅛	12⅝	—/—	—/—	11⅞	11⅞	11⅞	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	11⅞	11⅞	11⅞	—/—	—/—	11⅞
May	11⅜	11⅛	11⅛	11⅛	11⅛	11⅛	11⅛	11⅛	11⅛	11⅛	11⅛	12⅛	12⅛	12⅛	12⅝	—/—	—/—	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	—/—	—/—	11⅞
June	11⅜	11⅛	11⅛	11⅛	11⅛	11⅛	11⅛	11⅛	11⅛	11⅛	11⅛	12⅛	12⅛	12⅛	12⅝	—/—	—/—	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	—/—	—/—	11⅞
July	15⅛	15⅛	—/—	—/—	14⅜	15⅛	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—
August	15⅛	15⅛	15⅛	15⅛	14⅜	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
Sept.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Oct.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Nov.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Dec.	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝
1939																																
Jan.	—/—	—/—	16⅛	16⅛	16	16	—/—	—/—	15⅜	16	15⅜	—/—	15⅜	15⅜	15⅜	—/—	—/—	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜
Feb.	15⅝	15⅝	15⅜	15⅜	—/—	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	—/—	15⅜	15⅜	15⅜	—/—	—/—	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜
March	16⅛	16⅛	16⅛	16⅛	—/—	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	—/—	16⅛	16⅛	16⅛	—/—	—/—	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
April	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞
May	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞
June	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
July	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
August	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
September	18¾	18¾	19½	19⅛	19⅛	21½	19½	20	22	19¼	23¼	23	22¾	22	22	22	22	22	21¾	21½	22	22	22	21¾	21¾	20⅞	20⅞	20⅞	20⅞	20⅞	20⅞	21¾
October	20	19⅞	19½	19⅛	24	19½	—/—	20⅝	19	19¾	20½	—/—	19½	19¾	20	20	20	20	20	20½	20⅝	20⅝	20	20	20	20	20	20	20	20	20⅝	19⅞
November	20⅛	20⅛	20¼	20¼	19⅞	20½	19⅞	19⅞	19⅞	19¾	20⅝	20⅞	20⅞	20¾	20¾	20¾	—/—	20¾	20¾	20¾	20⅞	20⅞	20¾	20¾	—/—	20¾	19⅜	20⅛	20⅛	20⅛	20⅛	20⅛
December	20	20	—/—	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—
1940																																
January	—/—	19⅛	19⅛	19⅛	19⅛	19⅛	—/—	19⅜	19⅛	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—	—/—

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Markets)

Average Price per Pound for Years 1911-1931

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1912	121.60	1916	72.50	1920	36.30	1924	26.20	1928	22.48
1913	82.04	1917	72.23	1921	16.36	1925	72.46	1929	20.59
1914	65.33	1918	60.15	1922	17.50	1926	48.50	1930	11.98
1915	65.85	1919	48.70	1923	29.45	1927	37.72	1931	6.17

Average Monthly Price per Pound Since 1932

	1932 Cents	1933 Cents	1934 Cents	1935 Cents	1936 Cents	1937 Cents	1938 Cents	1939 Cents
Jan.	4.38	3.08	9.32	13.10	14.35	21.37	14.63	15.75
Feb.	4.03	2.95	10.45	12.92	15.48	21.33	14.71	15.93
Mar.	3.35	3.01	11.01	11.51	15.89	24.09	13.55	16.26
Apr.	3.02	3.56	12.10	11.55	15.98	23.44	11.84	15.87
May	3.09	4.95	13.26	12.05	15.62	21.14	11.57	16.07
June	2.66	6.15	13.51	12.57	15.85	19.29	12.57	16.37
July	2.89	8.01	14.60	12.10	16.49	18.86	15.37	16.51
Aug.	3.63	7.31	15.47	11.98	16.25	18.37	16.08	16.67
Sept.	3.84	7.30	15.36	11.55	16.46	18.55	16.15	21.24
Oct.	3.65	7.64	13.96	12.62	16.55	16.28	16.89	19.89
Nov.	3.44	8.66	13.04	13.15	17.97	14.60	16.24	20.21
Dec.	3.24	8.87	12.98	13.28	20.01	15.41	16.05	20.01
Average for Year	3.49	5.96	12.92	12.37	16.41	19.39	14.64	17.57

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1939 Oct.	1939 Nov.	1939 Dec.	1940 Jan.	Day	1939 Oct.	1939 Nov.	1939 Dec.	1940 Jan.
1	—/—	11 3/8	11 3/8	—/—	17	10 1/16	10 1/8	—/—	
2	9 5/8	11 1/8	—/—	11 3/8	18	10 1/2	—/—	11 1/8	
3	9 1/2	11 1/8	—/—	11 3/8	19	10 5/8	—/—	11 7/8	
4	9 5/8	—/—	11 1/8	11 3/8	20	10 5/8	11 1/8	11 1/8	
5	9 5/8	—/—	11 1/4	11 3/8	21	—/—	11 3/8	11 5/16	
6	9 1/2	11 1/8	11 1/8	—/—	22	—/—	11 3/8	11 5/16	
7	—/—	11 3/8	10 1/8	—/—	23	10 1/2	11 3/8	—/—	
8	—/—	11 1/8	11 3/8	11 3/8	24	10 5/8	11 1/2	—/—	
9	9 5/8	11 1/4	—/—	11 3/4	25	10 5/8	—/—	—/—	
10	9 1/16	11 3/8	—/—	—/—	26	10 1/8	—/—	—/—	
11	9 7/8	—/—	11 1/2	—/—	27	10 1/8	11 3/8	11 1/8	
12	10	—/—	11 3/8	—/—	28	—/—	11 3/8	11 5/16	
13	10 1/16	11 1/8	12	—/—	29	—/—	11 3/8	11 3/8	
14	—/—	11 1/8	11 1/8	—/—	30	10 3/8	11 1/2	—/—	
15	—/—	11 1/8	11 7/8	—/—	31	11 1/16	—/—	—/—	
16	10 1/16	10 1/16	—/—	—/—					

Average Monthly Price Per Pound

Month	1936 Pence	1937 Pence	1938 Pence	1939 Pence	Month	1936 Pence	1937 Pence	1938 Pence	1939 Pence
Jan.	6.758	10.378	7.077	7.926	Aug.	7.581	8.830	7.841	8.545
Feb.	7.255	10.503	7.029	7.942	Sept.	7.577	8.935	7.918	9.634
Mar.	7.450	11.766	6.590	8.120	Oct.	7.898	7.855	8.355	10.177
Apr.	7.502	11.471	5.793	7.910	Nov.	8.572	7.080	8.111	11.210
May	7.335	10.250	5.632	8.002	Dec.	9.580	7.332	8.005	11.559
June	7.352	9.548	6.147	8.216	Average for Year	7.713	9.424	7.164	8.959
July	7.696	9.136	7.464	8.271					

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1939 Nov.	1939 Dec.	1940 Jan.	Date	1939 Nov.	1939 Dec.	1940 Jan.	Date	1939 Nov.	1939 Dec.	1940 Jan.
1	9.18	10.30	—/—	11	—/—	10.85		22	9.93	11.15	
2	9.18	10.28	11.54	12	—/—	11.21		23	—/—	—/—	
3	9.37	—/—	11.63	13	9.82	11.66		24	9.94	—/—	
4	9.41	10.31	11.40	14	9.81	11.13		25	9.82	—/—	
5	—/—	10.33	11.29	15	9.71	11.33		26	—/—	11.29	
6	9.33	10.29	11.46	16	9.85	11.33		27	9.89	11.26	
7	—/—	10.53	—/—	17	9.83	—/—		28	9.97	11.31	
8	9.47	10.57	11.46	18	9.88	11.40		29	10.11	11.56	
9	9.60	10.69	11.43	19	—/—	11.14		30	10.16	—/—	
10	9.72	—/—		20	9.98	11.06		31	—/—	—/—	
				21	9.91	11.31					

Average Monthly Price Per Pound

	1936 Cents	1937 Cents	1938 Cents	1939 Cents		1936 Cents	1937 Cents	1938 Cents	1939 Cents
Jan.	11.91	13.06	8.57	8.94	Aug.	12.28	10.41	8.41	9.30
Feb.	11.53	13.15	8.91	8.97	Sept.	12.31	9.02	8.17	9.30
Mar.	11.43	14.46	8.92	9.00	Oct.	12.30	8.42	8.61	9.24
Apr.	11.71	14.23	8.76	8.87	Nov.	12.23	7.96	9.08	9.73
May	11.68	13.34	8.50	9.56	Dec.	12.83	8.26	8.72	10.97
June	12.02	12.70	8.38	9.88	Average for Year	12.11	11.44	8.66	9.46
July	13.11	12.26	8.85	9.71					

Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

End of:	ON HAND 1937	ON HAND 1938*	ON HAND 1939	AFLOAT 1937	AFLOAT 1938	AFLOAT 1939	ON HAND AND AFLOAT 1937	ON HAND AND AFLOAT 1938*	ON HAND AND AFLOAT 1939
Jan.	204,436	276,497	237,826	55,096	57,356	48,210	259,532	333,853	286,036
Feb.	195,692	292,067	231,475	53,538	47,459	55,814	249,230	339,526	287,289
Mar.	192,980	301,762	205,936	56,994	41,882	55,981	249,974	343,644	261,917
Apr.	176,289	303,901	190,896	72,530	39,071	57,918	248,819	342,972	248,814
May	175,273	300,907	193,602	58,542	32,859	54,046	233,815	333,766	247,648
June	172,056	294,796	181,794	57,215	32,079	51,274	229,271	326,875	233,068
July	167,094	282,785	174,240	75,779	40,400	52,990	242,873	323,185	227,230
Aug.	174,195	273,841	161,362*	80,439	47,772	66,717	254,634	321,613	228,079*
Sept.	186,193	268,094	150,171	83,288	48,927	68,310	269,481	317,021	218,481
Oct.	200,025	259,074	133,183	80,653	51,062	100,500	280,678	310,136	233,683
Nov.	222,707	242,542	118,535	81,302	51,114	114,044	304,009	293,706	232,579
Dec.	262,204	231,500		63,099	45,105		325,303	276,605	

* Revised.

STOCKS IN GREAT BRITAIN

(No. of Tons in Wharves and Warehouses, not including Latex)

At end of	London 1937	London 1938	London 1939	Liverpool 1937	Liverpool 1938	Liverpool 1939
January	29,005	40,203	51,420	41,895	21,711	28,789
February	26,508	46,596	48,312	37,078	24,737	26,784
March	21,292	50,233	46,768	30,622	26,220	24,996
April	21,128	54,296	44,760	27,443	28,277	23,742
May	21,351	57,194	43,454	25,081	29,862	22,211
June	21,964	60,307	42,374	21,258	31,837	21,176
July	22,589	62,236	37,772	19,424	32,825	19,116
August	25,211	65,113	28,363	19,817	34,315	16,218
September	28,462	63,321		21,190	34,645	
October	30,465	59,609		21,327	33,483	
November	33,304	57,794		21,399	32,116	
December	35,633	55,668		21,978	31,012	

(Figures from the Rubber Trade Association of London)

STOCKS IN OTHER CENTRES

(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)

	Penang and Singapore [1]	Malaya [2]	Ceylon [2]	Holland	Para and Manaos
At end of 1938					
September	35,386	53,815	5,339	662	1,599
October	34,901	54,720	4,916	669	1,796*
November	31,255	54,283	4,409	349	2,267
December	27,084	57,800	6,120	268	1,864
At end of 1939					
January	30,975	59,155	4,827	198	1,557
February	28,559	59,399	4,318	183	1,826
March	23,255	58,005	3,389	137	2,244*
April	22,434	55,238	3,648	131	2,209
May	20,849	52,837*	4,005	136	1,966
June	19,563*	55,834	3,771	101	1,821
July	27,042	55,948	4,217	188	1,474
August	20,570	50,625	3,134	315	1,914
September	23,482	52,755	2,742	...	2,682

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only.
* Revised.

RUBBER STOCKS AFLOAT

	Afloat for United States	Afloat for Europe	All Other * Afloat	Total * Afloat
End of: 1938				
October	51,062	26,100	21,838	99,000
November	51,114	26,700	14,186	92,000
December	45,105	26,800	8,095	80,000
End of: 1939				
January	48,210	27,900	28,890	105,000
February	55,814	28,300	21,886	106,000
March	55,981	25,200	20,819	102,000
April	57,918	27,200	13,882	99,000
May	54,046	25,700	16,254	96,000
June	51,274	25,260	11,466	88,000
July	52,990	31,000	21,010	105,000
August	66,717	30,000	23,283	120,000
September	68,310	30,000	35,690	134,000
October	100,500	35,000	37,500	173,000
November	114,044	35,000	21,956	171,000

* *Total Afloat* is an arbitrary estimate based on 1½ months' shipments as adopted by the Department of Commerce. *All Other Afloat* is determined by subtracting the amount of stocks in transit to the United States and Europe from the estimated total.

TOTAL PRINCIPAL WORLD STOCKS

(Figures from the Survey of Current Business)

At End of:	1934	1935	1936	1937*	1938*	1939
January	661,948	698,153	600,479	454,249	549,762	497,665
February	663,308	686,195	599,355	445,265	565,833	479,578
March	666,382	678,809	583,318	447,856	586,666	460,723
April	658,796	677,006	567,172	428,249	586,291	438,252
May	689,239	677,569	541,871	413,134	568,158	429,979
June	672,804	671,525	520,255	434,250	573,136	407,640
July	676,200	679,061	519,074	445,782	580,654	418,639
August	674,702	680,644	500,520	457,462	565,394	397,345
September	694,361	661,509	493,585	470,768	551,447	396,867
October	680,616	655,000	486,159	479,398	540,976	412,942
November	684,408	617,300	466,491	493,266	512,196	.....
December	705,975	613,987	466,576	545,533	482,852	.....
Monthly Avge..	677,395	666,397	528,738	460,022	555,280	.....

* Revised.

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Production Figures on Quarterly Basis

Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	11,004	6,635	13,437	13,355	11,376	15,565	7,532	13,702*
Apr.-June	12,980	14,412	13,565	12,597	14,892	15,834	8,353	13,490*
July-Sept.	9,245	14,707	9,822	11,312	14,914	12,207	11,240	15,109*
Oct.-Dec.	6,856	9,550	10,406	12,099	14,858	9,704	13,052	
Total	40,085	45,304	47,230	49,363	56,040	53,310	40,182	

Shipment Figures on Quarterly Basis

Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	8,760	6,981	10,730	11,154	10,554	14,143	7,534	12,156*
Apr.-June	18,021	15,139	14,998	13,473	15,940	15,741	10,363	14,908*
July-Sept.	8,141	13,707	11,648	13,489	14,037	13,106	11,748	15,745*
Oct.-Dec.	5,329	8,265	9,310	12,066	12,855	10,495	12,685	
Total	40,251	44,092	46,686	50,182	53,386	53,485	42,330	

Inventory Figures [2]

Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	9,878	7,290	11,651	11,675	8,762	12,004	10,521	10,248*
Apr.-June	4,999	6,615	10,219	10,755	7,556	12,081	8,470	8,909*
July-Sept.	6,096	7,595	8,419	8,288	8,690	11,200	8,022	8,364*
Oct.-Dec.	7,644	8,888	9,455	8,196	10,717	10,383	8,451	

Figures for Recent Months

	PRODUCTION 1937	PRODUCTION 1938	PRODUCTION 1939	SHIPMENTS 1937	SHIPMENTS 1938	SHIPMENTS 1939	INVENTORY [2] 1937	INVENTORY [2] 1938	INVENTORY [2] 1939
Oct.	3,846	4,183	5,431	3,807	4,126	5,188	11,228	8,237	8,657
Nov.	3,006	4,139	4,867	3,640	4,405	4,244	10,572	7,924	9,244
Dec.	2,852	4,729	....	3,048	4,154	....	10,383	8,451	....

AUTOMOBILE INNER TUBES

Production Figures on Quarterly Basis

Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	10,721	6,230	12,823	12,553	11,891	15,831	7,314	12,385*
Apr.-June	11,913	13,001	13,191	11,631	14,624	15,413	7,380	12,067*
July-Sept.	8,286	14,356	10,321	11,270	15,320	12,038	10,794	13,505*
Oct.-Dec.	5,970	9,000	9,891	12,425	15,201	9,092	12,360	
Total	36,890	42,587	46,226	47,879	57,036	52,374	37,848	

Shipment Figures on Quarterly Basis

Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	8,918	6,539	10,640	11,252	11,367	14,606	7,387	11,371*
Apr.-June	16,271	13,292	14,553	11,928	15,113	15,495	9,564	13,233*
July-Sept.	7,761	13,370	11,545	13,251	15,069	12,901	11,243	14,758*
Oct.-Dec.	4,961	8,189	8,306	11,636	12,874	9,765	12,099	
Total	37,911	41,390	45,044	48,067	54,423	52,767	40,239	

Inventory Figures [2]

Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	9,448	6,369	10,244	10,406	8,660	11,993	10,547	9,163*
Apr.-June	5,174	6,097	8,795	10,050	8,075	11,833	8,337	8,044*
July-Sept.	5,753	7,008	7,639	7,565	8,595	11,326	7,859	7,846*
Oct.-Dec.	6,749	7,815	9,180	8,231	10,945	10,312	8,166	

Figures for Recent Months

	PRODUCTION 1937	PRODUCTION 1938	PRODUCTION 1939	SHIPMENTS 1937	SHIPMENTS 1938	SHIPMENTS 1939	INVENTORY [2] 1937	INVENTORY [2] 1938	INVENTORY [2] 1939
Oct.	3,800	3,980	5,073	3,525	4,101	5,012	11,185	7,746	7,717
Nov.	2,891	4,029	4,513	3,359	4,138	3,940	10,605	7,665	8,214
Dec.	2,400	4,351	....	2,881	3,859	....	10,312	8,166	....

[1] Based on reports received from the Rubber Manufacturers Association.
[2] Held by manufacturers at end of period indicated.
* Revised.

Automobile Production

	United States Total	United States Passenger Cars	United States Trucks	Canada Total	Canada Passenger Cars	Canada Trucks	Grand Total
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933*	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,126
1934*	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935*	3,946,934	3,252,244	694,690	172,877	135,562	37,315	4,119,811
1936*	4,454,115	3,669,528	784,587	162,159	128,369	33,790	4,616,274
1937*	4,808,974	3,915,889	893,085	207,463	153,046	54,417	5,016,437
1938	2,489,635	2,000,985	488,650	166,142	125,081	41,061	2,655,777
1939							
Apr.	337,372	273,409	63,963	16,891	12,791	4,100	354,263
May	297,508	237,870	59,638	15,706	11,585	4,121	313,214
June	309,720	246,704	63,016	14,515	10,585	3,930	324,235
July	209,343	150,738	58,605	9,135	5,112	4,023	218,478
Aug.	99,868	61,384	38,484	3,475	1,068	2,407	103,343
Sept.	188,751	161,625	27,126	3,921	3,494	427	192,672
Oct.	313,377	251,819	61,558	9,640	7,791	1,849	323,017
Nov.	351,782	285,252	66,530	18,412	9,882	8,530	370,194
Dec.	.....	.....	.....	.....	.....	.....	.....

* Revised.
Note: U. S. figures represent factory sales; Canadian figures represent production.

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA [1]							NETHERLAND INDIES [4]						
	Gross Exports	Imports	Net Exports	Ceylon [2]	India & Burma [3]	Sarawak [3]	British North Borneo [3]	Siam [5]	Java & Madura	Sumatra E. Coast	Other N. I.	Indo-China [3]	Amazon Valley	All Other [5]	World Total [6]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,415
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,135	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,382	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,292	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1933	573,412	167,377	406,035	63,351	4,527	10,874	7,555	7,765	73,851	91,861	149,659	18,394	9,883	2,737	846,312
1934	677,361	211,803	465,558	79,746	10,492	17,233	11,103	17,545	87,400	112,058	175,470	20,170	8,903	2,985	1,008,663
1935	590,319	174,652	415,667	54,316	13,968	19,465	8,885	28,327	57,488	78,325	139,297	28,816	11,275	8,745	864,574
1936	520,286	167,799	352,487	49,692	14,724	21,243	8,177	33,702	61,307	84,577	152,205	40,782	14,193	11,466	845,431
1937	681,638	213,446	468,192	70,353	17,015	25,922	13,213	5,551	84,085	139,632	207,863	43,399	15,576	13,063	1,133,864
1938	526,911	156,101	370,810	49,528	15,178	17,792	9,512	41,080	57,526	94,501	145,909	58,518	14,618	12,920	887,892
1938:															
Aug.	47,246	13,735	33,511	4,401	953	965	728	**4,793**	**4,757**	**7,339**	**11,006**	**3,840**	**1,050**	1,074	**74,417**
Sept.	40,992	10,586	30,406	3,990	1,036	756	284	3,893	4,026	7,052	9,092	8,139	758	1,292	70,724
Oct.	42,294	16,599	25,695	4,893	1,111	1,612	1,075	4,438	4,486	8,229	17,166	3,638	1,796	1,092	75,231
Nov.	39,340	10,219	29,121	6,422	1,271	929	567	3,223	3,975	5,678	9,568	4,035	1,159	990	66,938
Dec.	32,901	7,607	25,294	3,212	1,586	599	227	3,029	1,873	4,332	4,315	9,815	2,205	1,021	57,508
1939:															
Jan.	43,332	19,049	24,283	7,237	1,879	2,342	1,604	2,918	6,787	11,261	20,630	4,739	1,708	1,200*	86,588
Feb.	43,084	13,889	29,195	5,495	1,565	1,484	664	5,606	4,833	8,410	11,658	5,659	1,056	1,200*	76,825
Mar.	43,259	14,035	29,224	3,718	1,393	1,177	344	5,401	5,361	8,084	14,428	4,636	1,331	1,200*	76,297
Apr.	43,668	13,996	29,672	2,225	1,260	2,446	1,687	2,660	5,321	9,250	13,691	2,581	1,139	1,200*	73,132
May	42,214	12,697	29,517	2,807	1,678	1,649	558	2,782	4,105	8,159	12,009	4,585	874	1,200*	69,923
June	31,541	9,567	21,974	3,708	1,452	1,157	332	1,748	5,839	8,846	12,754	4,630	591	1,200*	64,231
July	45,962	20,052	25,910	5,018	1,291	3,092	1,603	5,599	5,229	11,020	19,325	3,367	1,019	1,200*	83,673
Aug.	53,497	12,635	40,862	5,686	427	1,749	975	5,230	6,236	10,010	11,232	7,020	1,000	1,200*	91,627
Sept.	45,094	18,302	26,792	6,149	785	1,932	429	4,670	5,168	10,278	22,197	5,943	1,197	1,200*	86,740
Oct.	70,839	21,493	49,346	5,179	822	2,487	1,730	2,047	9,950	13,645	21,404	5,022	1,131	1,200*	113,963
Nov.	49,276	13,652	35,624	4,053	857	2,023	1,322	1,269	5,827	10,239	14,163	6,644	1,500*	1,200*	84,721
Dec.	41,568	8,466	33,102	9,496											

All figures from January, 1934, onward are net exports shown on a "dry rubber" basis as calculated by the International Rubber Regulation Committee. (1) Prior to January, 1934, Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex also is not included in the early years, which on a dry rubber basis was as follows: 1924—1,117 tons; 1925—3,618; 1926—3,263; 1927—2,439; 1928—2,247; 1929—3,574; 1930—2,750; 1931—1,940; 1932—5,193; 1933—10,470, and 1934—14,172 tons. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments on a dry rubber basis were: 1923—18 tons; 1924—90; 1925—6; 1926—20; 1927—½; 1928—1; 1929—2; 1930—11; 1931—2; 1932—2; 1933—1, and 1934—6 tons. (3) Official statistics. (4) Exports from "Other N. I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included in earlier years, which is as follows on a dry rubber basis: 1923—2,342 tons; 1924—1,008; 1925—2,239; 1926—44; 1927—84; 1928—1,395; 1929—437; 1930—2,744; 1931—3,874; 1932—3,488; 1933—5,260, and 1934—5,330 tons. (5) Calculated from official import statistics of principal consuming countries; also includes United States imports of guayule. (6) This total includes the third column for British Malaya and all other figures shown for other territories. (*) Figure is provisional.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(Long Tons)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	73	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,883	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,409
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,335	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439,172	158,482	49,560	59,330	28,439	69,905	21,398	47,271	9,642	9,115	3,758	12,418	6,900	10,999	926,389
1935	455,758	128,829	51,450	62,899	26,870	57,567	21,880	37,572	9,978	7,593	4,068	11,878	8,140	11,245	895,727
1936	475,359	—2,591	57,032	71,794	27,871	61,223	16,534	30,967	14,109	9,648	2,888	11,236	6,668	8,772	791,510
1937	592,394	92,707	59,871	98,170	36,088	62,311	24,733	30,462	19,164	14,970	4,343	4,680	2,400	13,063	1,055,356
1938	406,343	133,079	59,660	90,200	25,696	45,836	28,170	25,650	11,944	11,309	5,092	16,034	2,400	9,936	871,349
1938:															
July	22,209	12,678	5,433	6,927	2,685	3,099	3,641	541	1,215	1,106	528	1,151	200*	635	62,048
Aug.	31,494	12,891	3,662	7,190	1,832	2,033	2,078	739	1,182	1,238	259	965	200*	595	66,358
Sept.	34,436	8,100	5,094	7,390	1,405	3,584	1,799	1,725	1,779	519	385	1,830	200*	608	68,854
Oct.	33,830	3,085	3,791	6,326	3,139	3,204	3,921	2,000*	1,780	848	420	3,022	200*	9	65,575
Nov.	32,567	936	5,322	7,275	3,123	4,665	1,984	4,000*	660	636	530	1,209	200*	379	63,486
Dec.	37,051	4,134	5,820	7,481	2,198	4,000	2,355	2,500*	647	876	263	1,013	200*	648	69,186
1939:															
Jan.	36,614	836	4,684	7,227	2,867	2,553	2,133	4,000*	910	898	454	1,037	200*	1,131	65,544
Feb.	30,578	4,773	5,315	7,569	1,451	3,263	2,025	2,000*	1,741	1,068	184	858	200*	524	61,549
Mar.	45,286	8,082	4,503	8,036	2,458	4,019	1,525	2,000*	1,316	1,242	368	1,133	200*	463	80,631
Apr.	31,590	4,752	5,639	8,719	1,466	3,579	1,926	2,000*	1,108	855	333	1,062	200*	597	63,826
May	45,390	7,531	4,646	8,413	3,006	4,438	1,573	2,000*	1,188	792	518	1,654	200*	618	81,967
June	33,951	8,439	4,649	8,190	2,423	3,067	1,992	2,000*	1,308	621	672	2,703	200*	487	70,702
July	36,932	4,040	4,282	8,437	3,164	3,668	1,350	1,000*	1,422	859	565	824	200*	412	67,155
Aug.	38,319	2,044	4,000*		2,033	3,145	1,500*	2,000*	2,182	952	651	1,546	200*	400*	
Sept.	36,197	4,406	4,000*		2,639	9,254	1,500*	2,000*	875	1,079	222				
Oct.	39,735	8,530	5,000*		5,787				1,235		653				
Nov.	41,478										613				

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1]—United States imports of guayule are included in this compilation. *—Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE: THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.